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THE
DIFFICULTIES AND EMERGENCIES
OF OBSTETRIC PRACTICE

THE DIFFICULTIES AND EMERGENCIES OF OBSTETRIC PRACTICE

BY

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We dedicate

THIS BOOK

TO OUR PUPILS

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PREFACE TO THE SECOND EDITION

The gratifying reception that has been accorded to this book has made the early issue of a second edition necessary.

The text has been thoroughly revised and a good deal of new matter and 27 original illustrations have been added. We are indebted to Dr. Lake for the sketches from which two of these have been drawn.

PREFACE TO THE FIRST EDITION

The object of this work is to afford guidance in plain terms to the practitioner when he is called upon to deal with the difficulties and emergencies that attend obstetric practice.

The physiology and the management of normal pregnancy, labour and puerpery are deliberately omitted from these pages as not being germane to our purpose ; moreover, there are already many excellent text-books treating of these subjects.

The views expressed and the methods advised are chiefly founded on our own personal experience. Where this has been inadequate we have indicated the opinions of those on whom in such matters we place most reliance.

We are specially indebted to Dr. Hubert Bond, one of His Majesty's Commissioners in Lunacy, for the article on Insanity in connection with Childbearing, which is entirely by his pen.

We desire to express our appreciation of the interest and trouble which Dr. George Dupuy has taken over the illustrations: all of these are original.

Finally, our thanks are due to our publishers for their ready co-operation and the generous manner in which they have met our wishes.

London, 1913.

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THE DIFFICULTIES AND EMERGENCIES OF OBSTETRIC PRACTICE.

CHAPTER I.

The Difficulties in the Diagnosis of Pregnancy.

THE DIAGNOSIS OF PREGNANCY.

The difficulties in the diagnosis of pregnancy are conveniently discussed in two groups.

1.—THE FIRST HALF OF PREGNANCY.

The Syndrome of Pregnancy.

For practical purposes up to the twentieth week the diagnosis of pregnancy is founded chiefly on the ascertained combination of a period of amenorrhœa with a correspondingly enlarged uterus.

The association of an enlarged uterus with cessation of the periods in a woman of childbearing age is very nearly an absolute indication of pregnancy, for, with some rare exceptions, all other conditions causing uterine enlargement are usually characterised by excessive loss or, at all events, by no interruption of the menstrual cycle.

The exceptions referred to are hæmatometra and pyometra. In the first of these, the menstrual suppression is apparent only, the blood remaining pent up within the uterus. In the second, it is absolute owing to the inflammatory destruction of the surface from which the loss should occur. Both are, however, of such rarity and, when occurring, present such distinctive symptoms that they can hardly be urged against the validity of the general statement that an enlarged uterus accompanied by amenorrhœa in a woman of childbearing age almost certainly indicates pregnancy.

The difficulties that arise in diagnosis are therefore due either

to doubt as to the size of the uterus or to absence of, or uncertainty attaching to, the history of an accompanying amenorrhœa.

The Value of the Minor Signs of Pregnancy.

Before dealing with these cardinal points, it is necessary to discuss the diagnostic value of the minor signs of pregnancy, namely, morning sickness, breast changes, softening and blue coloration of the cervix, blue coloration of the vagina, "Hegar's sign," "quickening," and the uterine souffle.

Of these, morning sickness is also characteristic of alcoholism.

Breast changes are sometimes seen with uterine myomata,

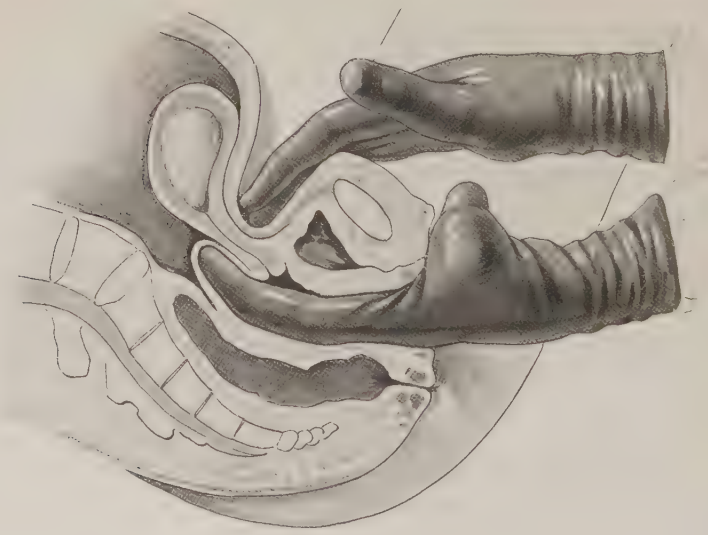


Fig. 1.—Hegar's sign.

ovarian cysts, spurious pregnancy, and other rarer conditions. Both of them, moreover, may be absent in spite of pregnancy.

Softening of the cervix may be simulated by inflammation, while coloration of the vagina is often not present in pregnancy, and is occasionally seen with impacted pelvic tumours.

"Hegar's sign" is of itself but little practical value in a case of difficult diagnosis, but in some cases when combined with other symptoms it affords presumptive evidence of real value. Its detection, however, necessitates more than the average experience in vaginal examination (Fig. 1).

"Quickening" depends solely upon the patient's statement, and as such, its value, especially in primigravidæ, is often *nil*. In

multigravidæ the patient's experience of this symptom gives it a greater significance.

The uterine souffle is an indication that the tumour felt is uterine in nature. It is best heard over the ovarico-uterine leash of vessels running up the side of the organ, and as the uterus is often somewhat rotated, this sign is usually heard on one side of the tumour or is limited to it altogether. A similar souffle is heard over a vascular myomatous uterus and even exceptionally over a uterus pulled up by the traction of a large ovarian cyst. On the other hand, a souffle is not always to be heard over a uterus undoubtedly pregnant; it may be present one day and absent the next.

The presence of *all* these minor signs is, of course, strong presumptive evidence, but it cannot be too strongly insisted on that, as regards the diagnosis of pregnancy, *the practitioner cannot as a rule afford to presume, he must be certain.*

Thus it comes about that, though useful more or less as confirmatory evidence, the presence or absence of the minor signs of pregnancy is quite incapable of settling the diagnosis where the absolute "syndrome," an enlarged uterus with amenorrhœa, is either absent or in doubt.

Uterine Enlargement.

The detection of uterine enlargement varies in its ease according to the advancement of pregnancy, the physique of the patient, and the consistency and position of the uterus.

In pregnancy of less than a month's duration, the increase in size is so small that its recognition is often impossible; moreover, it must be remembered that the unimpregnated uterus varies somewhat in size in different individuals, and enlargement so slight as this scarcely exceeds the upper limit of normal variation.

After the first month, the size of the uterus, if it can be estimated, is such that the possibility of a physiological enlargement other than pregnancy can be at once dismissed.

In a patient with a thick, rigid abdominal wall or a long narrow vagina, the period at which it becomes possible to recognise the enlarged uterus is considerably postponed.

At three months the uterus reaches the abdominal wall uncovered of coils of intestine in front of it, and it then as a rule can be palpated. Through an unusually thin or flaccid abdominal wall it is often possible to detect a month's enlargement, while, on the other hand, in very stout patients no definitely palpable tumour may be felt until the fourth month.

The consistency of a normal pregnant uterus in the earlier

months is always soft, and gives the impression of a thick-walled but somewhat lax cyst. At times this laxity may be so exaggerated that it is impossible to feel it definitely from the abdomen even up to the fifth month, especially if this unusual laxity occurs in a patient with a thick, rigid abdominal wall.

It is in these cases that percussion is specially valuable, revealing a space of dulness occupying the central area of the lower abdomen. It is, of course, most important to be sure that this dulness is not due to a distended bladder before estimating the value of this sign.

It is often possible to feel a uterus of this type by palpating the abdomen laterally with a hand on either side. In this way the mass may be caught between the two hands.

FIG. 2.—The position preferred by the authors for Bimanual Examination.

The uterine body when unusually soft is often difficult to feel from the vagina. It should, of course, be sought for through the anterior fornix. In such cases, bimanual examination is of the greatest value. It is important to remember that in this method of examination the vaginal finger should be held stationary at the point selected whilst the abdominal hand palpates the area under investigation in a direction downwards on to the vaginal finger. Any mass intervening between the two is then revealed by a sensation of pressure-transmission from the hand on the abdomen to the finger in the vagina. This pressure-transmission is the cardinal feature of bimanual examination, and by its means a tumour can be detected which is too soft to be felt by either hand singly employed.

The connection of the swelling felt from the abdomen with the

uterus is ascertained by transferring the vaginal finger to the cervix, when, if it be uterine, the pressure transmission occurs through the cervix.

In cases where the lower pole of the abdominal swelling can be felt from the vagina, its direct connection to the cervix can be felt through the vaginal vault. As regards the position for bimanual examination, we prefer that illustrated in Fig. 2, in which the patient lies on her side with the cross axis of the pelvis oblique whilst the shoulders are nearly horizontal, the trunk being somewhat twisted at the waist. In this position the examiner's weight can be brought to bear on the patient's abdomen, and the downward pressure required can be effected without muscular effort. Should it be desirable, the patient can turn on her back or forwards almost on to her face, the pelvis being thus rotated round the vaginal finger and successive quadrants brought into the range of greatest accessibility.

Where the uterus is retroverted, estimation of its size is more difficult because bimanual examination is impossible unless the abdominal wall is very flaccid. Where retroflexion coexists, the uterine body can be felt from the posterior fornix, and in this event enlargement, if present, can usually be appreciated, especially if it be examined through the rectum.

The most troublesome cases are those in which the axis of the uterine body corresponds with that of the upper vagina, for then the uterine body cannot be felt from either the anterior or the posterior fornix. In such pushing the cervix towards the sacrum may so antevert the body that it can be palpated bimanually.

Transmission of pressure from the abdomen to the finger on the vaginal cervix, though strongly pointing to the uterine nature of the swelling, may occur with extra-uterine tumours in very close relation to the uterus. Thus certain enlargements connected with the appendage, especially hydrosalpinx or ovarian cysts closely adherent to the uterus, may produce the same phenomenon. Under such circumstances, the diagnosis must be effected by feeling the fundus of the unenlarged uterus distinct from the swelling. In searching for it, regard should be paid to the axis of the cervix as a guide to the direction in which the fundus of the uterus is most likely to be lying. Where the extra-uterine tumour has anteverted the body of the uterus, as often happens with ovarian cysts, it can usually be easily felt immediately behind the pubes. Again, where it is lateriverted to the side opposite to the tumour, as in certain cysts in or burrowing under the broad ligament, it is felt as a rule without much difficulty.

The most difficulty arises when a lax-walled ovarian cyst lies in front of the uterus, retroverting it until its axis corresponds with that of the vagina.

In such circumstances the uterine fundus is as a rule inaccessible from above, and it may be impossible to distinguish the uterus apart from the swelling except under an anæsthetic. A greater degree of retroversion than this facilitates matters, because the body of the uterus becomes accessible from the posterior vaginal vault, and a swelling is then felt both behind and in front of the cervix.

It is, of course, possible that a swelling felt may consist of two parts not easily distinguishable from one another. Thus pregnancy may co-exist with an ovarian cyst, while in extra-uterine gestation the uterus is enlarged in addition to the mass formed outside it.

In either case, the distinction of the enlarged uterus from the rest of the mass of which it forms a part may be very difficult. In such circumstances careful bimanual search must be made for the fundus of the uterus, particularly in that situation in which the direction of the vaginal cervix suggests that it is lying.

Where the extra uterine swelling is markedly blended with that due to the enlarged uterus, as in some cases of extra-uterine gestation, though it may be impossible to feel the fundus as a distinct prominence, yet the portion of the swelling corresponding to the uterus may be distinguished by its firmer consistence and more definite outline.

Marked obliquity to or displacement of the cervix towards one side is not normal in pregnancy, and such a condition should always arouse suspicion of something outside the uterus.

A soft, extra-uterine tumour lying at the back of a retroverted uterus may closely simulate a retroflexed pregnant uterus, and the diagnostic problem is still further complicated if in the first case the retroverted uterus is itself pregnant, see p. 166.

The best indication as to whether the mass felt in the pouch of Douglas is the retroflexed body of a pregnant uterus or a tumour lying behind one retroverted, whether pregnant or not, is the direction of the vaginal cervix, which in retroflexion is pointed forwards, or even upwards, whilst in retroversion of the degree shown in Fig. 18, p. 172, it points in the axis of the vagina.

Where the abdominal wall is lax, it may be possible to feel the whole length of a retroverted uterus as it lies upon a tumour in the pouch of Douglas below it, whilst in some cases it is possible by vaginal examination to displace the tumour sufficiently to distinguish the retroverted uterus apart from it.

In this connection may be mentioned the devices of "rocking" and "weighing" the uterus in order to estimate the position and size of the uterine body. The former is performed by sharply rocking the cervix with the finger in the direction most expedient and judging, by the sensation of weight and resistance imparted, the lie of that portion of the uterus which is beyond the reach of direct touch.

The weight of the uterus may be gauged by lifting the cervix up with the finger applied to its posterior aspect. In performing it, due regard must be paid to the direction of the uterus, for it is obvious that, other things being equal, the greatest sense of weight will be imparted if the organ is in anteversion. Further, the resistance of the ligaments has to be taken into account. It is needless to say that these devices require practice to make them at all useful.

A retroverted pregnant uterus with a tumour lying behind it may be very difficult to diagnose from a simple retroflexed pregnant uterus, but there are two points of distinction: (1) that, in the latter, the cervix is but slightly, or not at all, displaced forwards, and never upwards; and (2) that a retroflexed uterus is with difficulty felt from the abdomen, while one retroverted with a tumour behind it still forms an appreciable mass as felt from above.

Reference may now be made to the possibility of mistaking the distended bladder for a pregnant uterus on account of its position, consistency, and the dull percussion note which it gives. Such a mistake is, of course, entirely due to overlooking the fact that the bladder may be full and a consequent failure to see that it is emptied either by the patient herself or, in cases of doubt, by the catheter.

Finally, given that it is definitely ascertained that the uterus is enlarged, there still remains the problem of deciding whether that enlargement is due to pregnancy.

For practical purposes the only other enlargement to be taken into account is that due to myomata. These tumours are rare under the age of thirty, and exceedingly so under twenty-five, so that it is in patients between thirty and forty-five years of age that the task of deciding between a myoma and pregnancy most frequently arises.

The most striking point of difference, namely, the menstrual history, will be dealt with presently. The enlargement caused by myomata is often so hard and irregular as to be immediately distinguishable from that due to pregnancy; but soft submucous

tumours situated in the corpus may very closely simulate the physiological state. It is in such that the menstrual history usually decides the diagnosis. Where, however, this is unreliable, diagnosis may be impossible except by watching the rate of increase in the size of the uterus or awaiting the fœtal signs. Practically a myoma never enlarges at the rate of a living gestation.

A fallacy may, however, exist in the exceptional cases of moles retained within the uterus for a long period, for in such the uterus ceases to enlarge, whilst its consistency, owing to the solid mass within it, becomes hard like a myoma. Coincidentally with this change, the cervix loses its characteristic feel and appearance, and the other minor signs of pregnancy disappear. Thus it comes about that the general characteristics of a long-retained molar pregnancy mimic a uterine myoma except as regards the menstrual history, see p. 237. Such cases have been subjected to hysterectomy under the mistaken diagnosis. The diagnosis of pregnancy complicating a myomatous uterus rests on the physical signs of the tumour associated with a history of amenorrhœa.

Amenorrhœa.

There are several circumstances under which the second factor required to complete the syndrome of early pregnancy may be unsatisfactory or wanting.

Deceit on the Part of the Patient.—The menstrual history of a patient usually rests on her own statement, which occasionally is not true. Unmarried girls unfortunately pregnant sometimes deny the fact that their menses have failed to appear, while married women strongly desirous of becoming mothers may allege this symptom of pregnancy when it does not exist.

Likewise convicted criminals, for the purpose of mitigating punishment, or unscrupulous individuals, as a means of obtaining money or securing marriage, may make similar false statements.

The falsity of such statements may be suspected from a knowledge of the circumstances peculiar to the case, but they can only be definitely proved by keeping the patient under observation.

When a woman alleges amenorrhœa, and examination definitely proves the uterus not to be enlarged, the diagnosis is at once settled; but it is otherwise when a patient has an enlargement, presumably of the uterus and suggestive of pregnancy, and at the same time asserts that the periods have been regular.

In such a case the alternative diagnosis is a uterine myoma which,

as previously stated, may on occasions very closely simulate pregnancy not only as regards the uterine enlargement, but also in the production of mammary changes and other minor signs.

The possible occurrence of the menses or losses of blood resembling them, for some month or two after the inception of pregnancy, is a further complicatory consideration, so that occasionally no diagnosis can be immediately arrived at.

If such false statements are suspected and a correct diagnosis is absolutely necessary, the patient should be taken into a nursing home or hospital, where she can be watched, and the appearance or absence of the menses be verified as the case may be.

When the practitioner suspects pregnancy he is absolutely justified in all cases in asking the patient herself whether its occurrence is possible; but should she deny it, it is not his business to contest her statement, whatever his private opinion.

The habit that unmarried girls have of denying their pregnancy is so constant as to form part of the normal psychological state of these women.

The proper reply on the part of the practitioner should be that had she admitted the possibility of pregnancy, he would have considered her to be pregnant, but that as she denies it, he is unable at present to state the nature of her condition.

In nearly all cases, the patient has already suspected pregnancy, and the reply made confirms her apprehensions just as well as a direct assertion, while in those rare cases in which the patient's statement is right and the practitioner's diagnosis wrong, the latter has not committed himself. Above all things, it is important not to discuss the question with the girl's relatives or employers, except in her presence and with her consent.

A mistress who has called in a medical man to see her servant frequently expects him to disclose to her the nature of his findings. He should absolutely refuse to do this except at the patient's desire and in her presence.

Hæmorrhage in Early Pregnancy.—The occasional occurrence of true menstruation up to the third month of pregnancy is well established. Cases of alleged menstruation throughout pregnancy are now and then met with. Some of these women have a double uterus, in others losses of blood occur from the cervix at more or less regular intervals and mimic the periodic flow. True menstruation from a uterus containing a pregnancy is, of course, impossible subsequent to the obliteration of the cavity that occurs after the third month.

If the menses do occur after the supervention of pregnancy, they nearly always differ from those that have preceded it, usually in the direction of being more scanty; but it is not at all uncommon for the occurrence of pregnancy to be announced by one unusually profuse period.

In such a case, the patient usually reckons the commencement of the gestation from a date subsequent to the profuse loss, whereas it has really preceded it.

Not infrequently the early months of pregnancy are associated with recurring losses of blood in small amounts, although the usual menses are absent. These slight losses either come from the decidua vera or from the cervix, and may lead the patient to state that, instead of having missed any period, they are coming too frequently.

These cases of early pregnancy with intermittent hæmorrhages are very important, for the occurrence of gestation is apt to be overlooked and the symptoms attributed to endometritis, cervicitis, or cervical erosion, a supposition the more easily led up to because the uterus feels large and "congested." In many instances these cases have previously suffered from chronic cervicitis and endometritis, with irregular hæmorrhages and leucorrhœa which the hyperæmia consequent on pregnancy accentuates.

Thus, the practitioner may be led to advise curettage or intra-uterine applications in ignorance of the fact that the uterus is pregnant.

It has been insisted on that the diagnosis of pregnancy in the early months is chiefly founded on the occurrence of the syndrome of a period of amenorrhœa associated with an enlargement of the uterus. In the majority of cases this amenorrhœa is *sudden* in onset, that is to say, the menses have been perfectly regular and normal up to the date of their disappearance. This sudden cessation is an important point; for other causes of amenorrhœa act as a rule more gradually, the amount of the menses diminishing month by month till they at last stop altogether. Thus quite apart from any examination for uterine enlargement, if an apparently healthy woman of childbearing age who has been menstruating regularly suddenly stops, she is very likely to be pregnant, no matter what her civil state may be.

To this may now be added that the occurrence of a period of irregular hæmorrhages in a woman who up till that time had menstruated normally, and associated with a symmetrical enlargement of the uterus corresponding in size to the period of disturbed menstruation, is also very suggestive of pregnancy if she be of child-bearing age, and especially if she be under thirty years.

On the Course to be Pursued where the Diagnosis is Doubtful.

Where the practitioner is not satisfied that the patient is pregnant, he should plainly state the fact, explaining at the same time the reasons for being unable to arrive at a definite conclusion. Where there is no necessity for immediate diagnosis, the patient should be instructed to present herself again in a month's time, when in all probability a definite conclusion will be able to be reached.

Under certain circumstances, however, it is necessary to settle the question at once if possible, and in such Abderhalden's test should be applied, and if this is inconclusive an examination under an anæsthetic may be demanded.

Abderhalden's Test for Pregnancy.

The fact is stated that when foreign albumins are introduced into the circulation ferments are produced to destroy them with the result that peptones are produced. These ferments are specific, varying with the particular kind of albumin introduced. It is known that chorionic ectoderm enters the blood stream as early as the first month of pregnancy. The serum of a pregnant woman therefore *should* contain a specific proteolytic ferment which will digest placental albumin and produce peptones. If then the serum of any woman does contain such a ferment, placental elements must have gained entrance to that woman's circulation—that is, the woman must be pregnant or have been recently delivered. This is the principle of Abderhalden's test for pregnancy.

Abderhalden has devised two techniques : one is known as the "Optical test" in which the polarimeter is used, and the other as the "Dialysation test," in which he uses special dialysers and a reagent known as Ninhydrin (Triketo-hydrinden-hydrate), which gives a deep blue colour if the test is positive and a slightly yellow or no colour at all if negative.

With the details of these tests we are not here concerned. Unless they are carried out with the greatest care by an expert they are subject to certain fallacies.

In England, Mackenzie Wallis[1] and Archibald Leitch[2] have given special attention to Abderhalden's test.

Having himself investigated the sera of fifty pregnant women, Mackenzie Wallis has arrived at the following conclusion : -

1. The serum of pregnant women contains a specific ferment capable of digesting placental tissue, and this ferment can be

[1] *The Journal of Obstetrics and Gynæcology*, Vol. XXV., No. 2, 1914.

[2] *Brit. Med. Journ.*, July 25th, 1914.

detected from the eighth week of pregnancy until ten days after delivery, both by the optical and by the dialysation test.

2. That both tests should always be applied to the serum from the same case, and that the accuracy of the results depends entirely upon the most scrupulous care in details of technique.

3. That the tests appear to be of value in diagnosis, more especially in the following conditions :—

(*a*) The early diagnosis of pregnancy.

(*b*) The differential diagnosis between fibromyomata and pregnancy.

(*c*) The diagnosis of ectopic gestation.

(*d*) The diagnosis chorion-epithelioma.

(*e*) The presence of retained placenta.

4. That there is at present no justification for stating that the serum of pregnant women will digest other than placental tissue.

5. The claims of Abderhalden that the optical and dialysation tests are of value in the diagnosis of pregnancy are established.

6. The optical is by far the more reliable of the two tests.

On the other hand, Archibald Leitch, having applied the dialysation test to a hundred cases, thirty-six of whom were pregnant, concludes that, having made all possible allowances, the percentage of glaring mistakes is sufficient to destroy its diagnostic worth.

The matter is still *sub judice*.

Examination under an Anæsthetic.—By this means, the size of the uterus or its relation to a tumour felt can be more readily proved. Where, on the other hand, the difficulty does not lie in the question of uterine enlargement, but in a dubious menstrual history, examination under an anæsthetic does not assist matters. Thus, in a woman of thirty-five who has a uterus the size and consistency of three months' pregnancy, but denies the possibility and asserts that her menses have been normal, the practitioner can either postpone making a diagnosis until two months have elapsed, by which time definite fœtal signs should be present if she is pregnant, or he can take her into an institution shortly before the date at which she asserts the next period should appear in order to confirm the truth of her statements.

The urgency for immediate diagnosis in doubtful cases of pregnancy is most commonly related to domestic or social reasons, and in such the passage of a sound under an anæsthetic is, of course, prohibited.

Where, however, there are medical reasons for immediately establishing the diagnosis, and the case is so obscure that even under an anæsthetic the fact of pregnancy cannot be

proved, it is justifiable as a last resource to pass a sound or even digitally to explore the uterus, for under such circumstances the necessity for relieving the symptoms outweighs the possibility of having to disturb a pregnancy, and moreover in cases so atypical as this, it is very unlikely that the gestation is a normal healthy one.

2.—THE LAST HALF OF PREGNANCY.

From the fifth lunar month onwards, the diagnosis of pregnancy is chiefly founded on the signs indicating the presence of a fœtus, namely, the discovery of fœtal parts and movements, the pulsations of the fœtal heart, and the funic souffle. To these may be added as accessory signs the intermittent contractions of the uterus and the shortening of the cervix that occurs in the last few weeks of pregnancy.

Fœtal Parts.—The ease with which the fœtal parts are felt varies in different cases and according to the advancement of the pregnancy, being less distinct in fat persons, especially when the uterus contains much liquor amnii and in the earlier part of the period under discussion.

Where there is difficulty in feeling them by ordinary palpation, they should be sought for by "dipping" *i.e.*, by suddenly displacing the supervening liquor by a sharp stab-like motion of the finger-tips, in the same way that the liver is palpated in ascites. In regard to great obesity of the abdominal wall, it may be recalled that through the umbilicus the underlying abdominal contents may be palpated without any fat intervening even in the stoutest patients.

The fœtal head is best felt with a hand on each side of the abdomen, well pressed down to the brim of the pelvis. By the same dipping movement as described above, with the fingers of one hand the hard head may be propelled against the fingers of the opposite hand (external ballottement), or by a combined movement it may be caught and held between the two hands.

External ballottement is sometimes elicited more easily, especially in cases of hydramnios, with the patient lying on her side and the abdomen hanging over the side of the bed. The practitioner then places one hand above the abdomen and one below, and dipping with either hand feels the child.

The tactile sensation produced by fœtal parts is very rarely simulated by any other condition, but occasionally multiple malignant masses in the peritoneum associated with ascites may yield a similar effect.

Vaginal examination reveals the lower pole of the fœtus lying

above the vaginal vault. In the later months its presence is at once obvious, but in the fifth and sixth months it may require "dipping" for. The short stabbing movement through the anterior vaginal vault displaces the liquor and allows of the head being struck. Frequently it rebounds on the finger in a very characteristic way (internal ballottement).

Where there is difficulty in feeling the lower fœtal pole with the

Fig. 3.—Auscultation of the Fœtal Heart.

vaginal finger alone, bimanual examination by pressing it down assists matters.

Fœtal Movements.—Fœtal movements are so characteristic as to form an absolute sign. They are one of two kinds, a sharp knock and a slower "vermicular" movement. The former can be heard with a stethoscope. The latter might be simulated by intestinal peristalsis.

Fœtal Heart and Funic Souffle.—The sound of the fœtal heart is, of course, the most absolute sign of all. Though it is occasionally heard as early as the end of the fourth month, for practical purposes it is not to be expected until the end of the fifth. When

listening to it, the stethoscope should first be applied over the region in which it is supposed the back is lying.

The disengaged hand should meanwhile steady the fœtus from the opposite side and keep it pressed against the stethoscope. This is particularly important in the earlier months, because, on account of the relatively large amount of liquor and the free mobility of the fœtus, the pressure of the stethoscope tends to displace the fœtal body (Fig. 3). Mistakes may arise from interpreting a rapid maternal pulse-beat as the fœtal heart. The two sounds are, however, quite unlike. The former is conveyed through the uterus from the great vessels behind it, and is often accompanied by a definite heave which can be appreciated by the hand holding the stethoscope. If there is any doubt, the rate and rhythm of the sound heard should be compared with the mother's heart by feeling her carotid pulse with the other hand.

The funic souffle when heard is, of course, another absolute sign, but its occurrence is a freak of coincidence.

Uterine Contractions and Shortening of the Cervix.—Intermittent uterine contractions are peculiar to pregnancy, except in the very rare phenomenon of a large myoma spontaneously extruding. Shortening of the vaginal cervix is also seen, with myomata growing in the cervix os extruding through it. The first sign cannot always be elicited; the second occurs so late that the pregnancy is already obvious on other counts.

DIAGNOSIS.

From an Ovarian Cyst.—Pregnancy in its later half can rarely be confused with any other condition if systematically investigated, except in the case of great obesity or extreme superabundance of liquor amnii. In the first, the fœtal heart and parts may not be recognisable through the thick abdominal wall, but vaginal examination will reveal the lower pole of the fœtus. In the second, vaginal examination may also be inconclusive, so that an ovarian cyst may be simulated. It is here that auscultation by revealing a uterine souffle may disclose the real condition.

A large ovarian cyst may be mistaken for pregnancy in the later months, but it differs from it in the absence of fœtal signs, and most important of all, that the uterus will probably be detected unenlarged and apart from the swelling. Exceptionally this absolute sign may not be obtained, and reliance must then be placed on the menstrual history and the absence of fœtal signs. Amenorrhœa is not often seen with ovarian cysts in women below

the climateric until the tumour has had a serious effect on the patient's health. Its occurrence often points to a lesion affecting both ovaries to total destruction. Such cases are usually due to bilateral malignant disease, including the papilliferous cysts. It is in such that the presence of ascites with multiple peritoneal

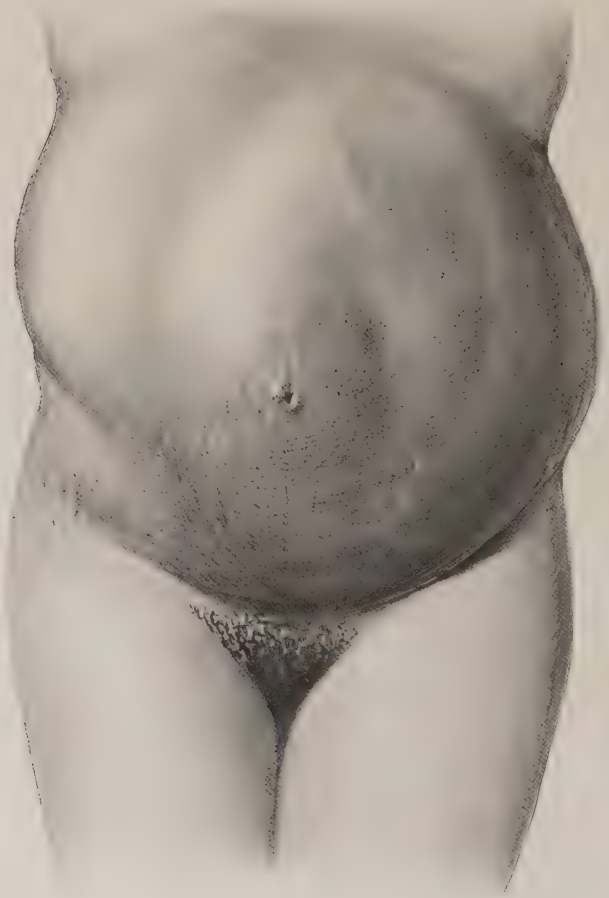


Fig. 4.—Ovarian Cyst and Pregnancy.

metastases may simulate fœtal parts and liquor amnii. Hence, of all ovarian disease, these cases are the most likely to be mistaken for pregnancy. Finally an ovarian cyst may coexist with pregnancy. In this case two definite swellings may be felt. In others though only one tumour appears to be present, yet over a certain area of it neither uterine contractions nor fœtal parts or heart

beat can be detected. The most likely error is to mistake the condition for one of hydramnios. In the latter state, however uterine contractions can be felt to occur all over the area of the swelling (Fig. 4).

From Ascites.—The distinction of ascites from pregnancy is usually easy, for the areas of dulness are different. Exceptionally, however, the peritoneal fluid may be encysted, and the characteristic dulness in the flanks and resonance in front may be absent. This is particularly seen with some forms of tubercular peritonitis and malignant new growth. If amenorrhœa from ovarian destruction or inhibition is also present, pregnancy may be simulated.

In all such cases, the detection of the uterus apart from the abdominal tumour or enlargement is the cardinal distinction from pregnancy.

From Obesity.—Sheer obesity and flatulent distension associated with amenorrhœa from any cause may be mistaken for pregnancy, especially on the part of the patient.

In very stout persons, percussion of the abdomen may fail to give a satisfactory note, so that this test of the presence of a tumour may be futile. The umbilicus in simple obesity is very deep; in advanced pregnancy it is always more or less shallowed. Lateral palpation is very useful here, as is dipping through the umbilicus.

Where a tumour, such as a pregnant uterus, overlies the aorta, the impulse of the latter is conveyed through it to the abdominal wall, and can be both seen and felt with a distinctness not present in an abdomen protuberant from fat and flatus only.

From Myomata.—Uterine myomata large enough to be mistaken for pregnancy in the later months are practically never associated with amenorrhœa. On this point alone, the differentiation is easy; see also p. 7.

THE AGE OF THE PREGNANCY.

The age of any given pregnancy is estimated:

By calculation from the known or assumed date of the fruitful coitus.

By the height of the uterus.

By the bulk of the uterus.

From a consideration of the dates at which certain of the signs of pregnancy appeared.

Calculation from the Date of Coitus.

Where the date of the fruitful coitus is definitely known, the age of the pregnancy can be calculated for certain. It is rare, however, for such data to be forthcoming. In lieu of such it is usual to assume that pregnancy immediately followed the date of the last day of the last menstrual epoch that appeared. From this the date at which the labour is to be expected is calculated by counting back three months, and to the date thus arrived at adding five days, or by counting forwards forty weeks with the aid of a

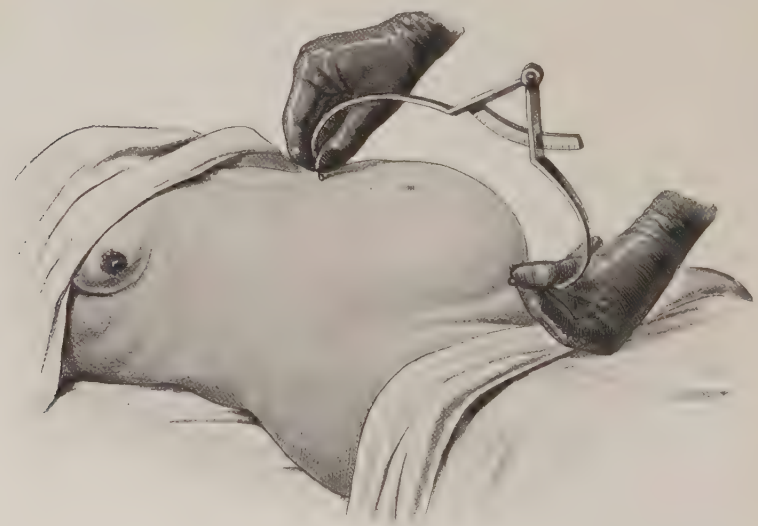


FIG. 5.—Calculating the Age of the Pregnancy by measuring the Height of the Uterus by Callipers.

calendar. Thus if the last day of the last monthly epoch was April 5, three months counted backwards make January 5, to which by adding five days January 10 is arrived at as the day on which the labour is due.

Seeing, however, that pregnancy may have occurred at any time between the termination of the last menstrual flow and the date at which the next one should have appeared, there is a possible error of three weeks in this method of calculation. It should, therefore, be explained to the patient as merely approximate, and as representing the beginning of a period of three weeks, during any time of which labour at term may come on.

The Height of the Uterus.

The height of the fundus of the uterus above the symphysis pubis bears a close relation to the age of the pregnancy. This estimation may be carried out by callipers or by McDonald's method.

Callipers.—The fundus of the normal unimpregnated uterus reaches about 1 inch above the upper border of the symphysis with the patient lying on her back.

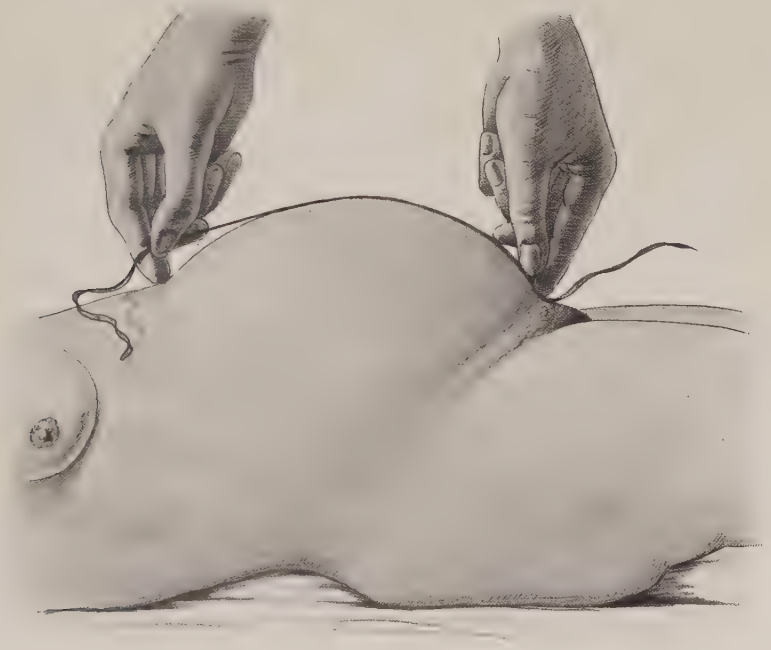


FIG. 6.—Measuring the Height of the Uterus. McDonald's Method.

Every lunar month of pregnancy adds an inch to this. Thus:

At	1	lunar	month	or	4	weeks	the fundus is	2	inches above the symphysis.
At	2	lunar	months		8	„	„	3	„ „ „
At	3	„	„		12	„	„	4	„ „ „
At	4	„	„		16	„	„	5	„ „ „
At	5	„	„		20	„	„	6	„ „ „
At	6	„	„		24	„	„	7	„ „ „
At	7	„	„		28	„	„	8	„ „ „
At	8	„	„		32	„	„	9	„ „ „
At	9	„	„		36	„	„	10	„ „ „
At	10	„	„		40	„	„	11	„ „ „

To measure the height of the uterus in the later months, callipers are necessary to avoid the curve of the abdominal wall (Fig. 5).

The umbilicus in most persons is 6 inches above the symphysis, so that at the fifth lunar month the top of the uterus has reached that point.

McDonald's Method.—Ellice McDonald has described a method [1] which depends on the fact that the height of the fundus as measured along the curve of the abdominal wall increases 3·5 centimetres for every lunar month of pregnancy.

"The measurement is taken with the patient lying flat, and one end of the tape is placed at the upper border of the symphysis, while the other is held by the thumb on to the palm of the other hand. The fingers of the upper hand are held at right angles to the fundus of the uterus" (Fig. 6). At full term the uterus is 35 centimetres high.

Both these methods are accurate in the later months, though they should be used to control one another.

In the early months, however, the uterus also varies in its height according to the position in which it lies. Thus it reaches highest, other things being equal, when it is lying directly in the axis of the patient's body, and lowest when it is acutely anteflexed or retroflexed.

The Bulk of the Uterus.

All experts in obstetrics estimate the age of a pregnancy not merely by the height of the uterus, but by its bulk as well. This is especially the case in the earlier months.

It is impossible to give accurate figures as to the size of a pregnant uterus, because the bulk as felt on examination would not correspond to exact measurements taken during an operation or *post-mortem* examination.

For rough purposes the following may be accepted: At one month the body of the uterus feels the size of a duck's egg, at two months the size of a large pear, at three months the size of a man's fist, at four months the size of an infant's head, at five months it has reached the umbilicus and extends outwards to one inch from the anterior iliac spines (Fig. 7), at six months it nearly reaches the anterior spines laterally, at seven months it is as high as the lower border of the costal margin but has not begun to invade the flanks (Fig. 8), at eight months it is beginning to fill up the flanks. The appearances at term are shown in Figs. 9 and 10.

[1] *Brit. Journ. of Obst. and Gyn.*, Vol. XXI., No. 2.

The Appearance of "Signs."

Consideration of the dates at which the signs of pregnancy have manifested themselves is useful as an accessory method of determining the duration of pregnancy.

In this connection it should be borne in mind that morning sick-

FIG. 7.—Abdominal Contour. Five Months' Gestation.

ness usually appears at about the fourth week and "quickening" at about the sixteenth week. The fœtal heart for practical purposes cannot be heard before the twentieth week.

DIFFICULTIES.

Difficulties in estimating the age of a pregnancy may arise from several causes.

As has been pointed out, it is not at all uncommon for a patient to have one menstrual period after she has become pregnant; she may even have three menstrual or pseudo-menstrual losses. The period or periods following pregnancy nearly always, however, differ from

FIG. 8.—Abdominal Contour. Seven Months Gestation.

the normal ones that preceded it: they are slighter and of less duration as a rule, but occasionally a single profuse menstrual flow ushers in the beginning of pregnancy. Conversely, pregnancy may begin during a period of amenorrhœa.

The height and size of the uterus may be misleading. Thus in

the early months, as has been pointed out, the distance the fundus reaches above the symphysis varies with the position of the organ.

Oligamnios either from non-formation or leakage of the liquor results in an abnormally small uterus. Thus one containing a five

Fig. 9.—Abdominal Contour. Full Term in a Primigravida.

months fœtus may not be larger than the normal organ at four months.

Death of the fœtus or mole formation with continued amenorrhœa may be puzzling, because the uterus is smaller than the age of the pregnancy as estimated by the calendar would warrant.

Occasionally, however, the uterus though containing a mole may

be larger than the history of amenorrhœa would indicate. This is particularly the case with some vesicular moles, but it can also occur with a blood mole if there is retention of much blood clot in the cavity.

Hydramnios, twins, monsters, or distension of the fœtal cranium,

FIG. 10.—Abdominal Contour. Full Term in a Multigravida.

thorax or abdomen may all cause the uterus to be markedly larger than the age of the pregnancy as estimated by the calendar would lead the practitioner to expect.

A fibroid tumour may increase the size of the uterus, and finally

in contracted pelvis the uterus may be abnormally high in the abdomen.

Elucidation of the true state of affairs in all these abnormal circumstances can only be made by employing the various methods already detailed, and checking the results one against the other.

THE DIAGNOSIS OF DELIVERY.

The practitioner may be called upon to give evidence as to whether a woman has been delivered either recently or some time in the past.

The sooner after childbirth the practitioner has an opportunity of examining the woman the more easily can a diagnosis be made. In a primipara the signs will be more evident; the nearer to term the child has been born the more marked will be the signs; and, lastly, in the dead additional appearances of the greatest value may be observed.

Recent Delivery.

No particular difficulty will be experienced in arriving at a diagnosis for the first two weeks of the puerperium, especially after a full-time labour. After this, however, and particularly if the ovum was expelled during the first half of pregnancy, it may be difficult to form an accurate decision as to when the child was born.

SIGNS.

One or more of the following signs will be found if a woman has been recently delivered:

She may or may not look ill; this will depend upon how much blood she lost and the character of the labour. The mammary glands will be secreting colostrum or milk, the abdomen will be lax, striæ gravidarum will be noted, and a line of pigment extending between the umbilicus and the pubes is seen.

The uterus will be felt on abdominal examination, and the height of its fundus will form some clue as to the date of childbirth.

Lochia may or may not be escaping from the vulva. The vulval orifice will have a bruised and lax appearance, and there may be signs of recent tears. The hymen will be deeply lacerated.

The cervix will be soft, may be lacerated, and within the first week the finger can be passed into the uterus, and for a much longer time into the cervical canal. Abderhalden's test may be positive up to ten days after delivery.

A *post-mortem* examination of the uterus would disclose the placental site.

Remote Delivery.

It may be impossible to give a decisive opinion as to whether a woman has been delivered if a long period has elapsed since the pregnancy.

SIGNS.

Abdomen.—White lines on the abdomen are evidence that it has been markedly distended, and the commonest cause of such distension is pregnancy; they are termed lineæ atrophicæ. But any other condition stretching the skin, such as large abdominal tumours or ascites, can cause similar white lines. Further, pregnancies terminating before the sixth month leave no marks on the abdomen.

Vagina and Vulva.—The vagina and vulval orifice may show signs of some large body having been expelled. Thus there may be the scars of old lacerations, the orifice may be obviously stretched and enlarged, the hymen may be torn down to its base, and parts of it may have sloughed away, leaving tags behind (carunculæ myrtiformes). While it is true that the commonest large body to be expelled is that of the child, the removal of a large fibroid polypus may leave traces of a similar character behind. Expulsion of the ovum in the early months causes no appreciable change in the vulva and vaginal outlet. Occasionally, even after the birth of a full-term child, the parts may reassume an almost virginal appearance.

Neck of the Uterus.—As the cervix is generally lacerated at childbirth, the presence of a laceration is suggestive, but the same condition may result during the extraction of submucous fibroid or polypus. On the other hand, the cervix is not always lacerated, especially when the ovum is expelled before term.

Body of the Uterus.—On examination of the body of the uterus after death absolute evidence may be obtained, but for not longer than a year. Up to this time the placental site can be identified by the remains of the sinuses, thickened arteries, and pigmentation. The shape of a parous uterus differs from a nulliparous, in that in the former the top of the fundus is more or less curved, and in the latter it is level. A parous uterus is also larger than a nulliparous, but there are other conditions that will lead to a permanent enlargement of the uterus besides pregnancy.

CHAPTER II.

Disorders of the Intestinal Tract.

SALIVATION.

Ptyalism is an uncommon complication of pregnancy. In some instances, however, the amount of saliva secreted may be very large, and cases have been reported where the patient has expectorated over 2½ pints every twenty-four hours.

This abnormal secretion is more common in the earlier months of pregnancy and at times is associated with vomiting, for which reason its cause is thought to be in some cases a reflex neurosis, and in others an auto-intoxication. If the salivation is marked, the health of the patient may deteriorate.

TREATMENT.

This complication should be treated with alkaline and astringent mouth-washes, such as alum ʒj ad Oj, together with the careful administration of belladonna or atropin up to the limit of tolerance. If such treatment fails to give relief the patient may be put on a strict milk diet with thorough regulation of the bowels, on the assumption that auto-intoxication is the cause.

INFLAMMATION OF THE GUMS.

Gingivitis is mostly seen in anæmic and debilitated women, the gums becoming inflamed, spongy, and bleeding easily.

The fact that the condition tends to rapidly mend after delivery is a sufficient indication that in such cases pregnancy is a predisposing cause of the trouble.

At times the gums bleed apart from any demonstrable lesion.

TREATMENT.

The use of an astringent mouth-wash is indicated, and great improvement often follows the direct application once a day of a mixture of carbolic acid, 1 in 60, and citric acid, gr. xx. ad ʒj, applied to the gums at their junction with the teeth.

TOOTHACHE.

It is generally supposed that pregnancy increases the liability to dental caries, by the decalcification which is a part of pregnancy,

or by an altered secretion of the mouth encouraging the growth of micro-organisms. It is certainly a fact that many women suffer from toothache when they are pregnant, but it is equally true that a large number do not. Whether, therefore, the dental caries is a consequence of or a coincidence to pregnancy we are not prepared to say.

TREATMENT.

The proper care of the teeth is at no time more important than during this epoch.

If, therefore, a pregnant woman is suffering from toothache due to a carious tooth, she should be directed to a capable dentist, who in the first few months may stop it permanently, but in the later months should stop it temporarily with guttapercha, leaving the permanent stopping till the child is born. If too bad to stop, the tooth may be extracted under gas without any fear of inducing abortion in the earlier months of pregnancy; after the sixth month the liability of inducing premature labour is present. Each case must therefore be judged on its own merits before deciding to extract the tooth.

DYSPEPSIA.

Some women when pregnant suffer exceedingly from indigestion and flatulence. The diet must be supervised, constipation avoided, and the treatment by drugs conducted on the usual lines.

CONSTIPATION.

A pregnant woman is very apt to become constipated, partly from the lessened amount of exercise she must necessarily take, and also because the stretched abdominal wall is unable to exert its accustomed pressure on the bowels.

Constipation must be carefully guarded against during pregnancy, since the intestinal tract forms an important channel for eliminating some of the toxins that are more or less peculiar to pregnancy, and also there is an increased tendency to hæmorrhoids.

TREATMENT.

An endeavour should be made to regulate the bowels as far as possible by means of the diet.

With regard to the drug treatment, great care must be taken to prescribe only mild laxatives, strong purgatives being liable, especially in some women, to bring on uterine contractions.

The particular drug ordered depends on the idiosyncrasies of the

patient, since what will have a marked effect on one patient will have none on another. Inquiry, therefore, should be made as to the aperient that is generally most suitable, and if it is of a proper nature it may be prescribed.

DIARRHŒA.

Diarrhœa is an uncommon complication of pregnancy, and when it does occur is usually due to some article of diet that has irritated the intestinal mucous membrane. Rarely the growing uterus, by its pressure, appears to have a similar result.

Diarrhœa in a pregnant woman should be at once controlled, since it has a tendency to make the uterus expel its contents.

TREATMENT.

It may be best treated by bismuth or chalk in combination with opium, the latter drug being also useful to steady the uterus.

VOMITING.

Cases of vomiting in pregnancy may be divided into two groups: one in which the vomiting is merely associated with the pregnancy, and the other in which it is due to this state. A failure to recognise which group a particular case belongs to may easily lead to a disastrous result.

Vomiting associated with Pregnancy.

Among the causes of vomiting that have been noted in connection with this group are acute intestinal obstruction, appendicitis, carcinoma of the stomach, gastric ulcer, cerebral tumour, and ovarian cyst. Many cases which come in this group are not diagnosed, and it is only on a *post-mortem* examination, or on a further examination after induction of labour has failed to relieve the patient, that the true cause is discovered.

These undiagnosable cases are fortunately not common, but they are most important because they are generally regarded during life or before the induction of labour as being toxæmic in character.

The diseases which have given rise to this difficulty in diagnosis even after repeated examination by competent observers have been carcinoma of the stomach, tubercular peritonitis, strangulation of intestine by bands, an ovarian cyst with a twisted pedicle, strangulated Meckel's diverticulum, chronic alcoholism, carcinoma of the liver, cerebral tumour, gangrenous typhlitis, septic bronchial glands, gastric ulcer, and chorio-carcinoma of the brain, kidney, and liver. We are, therefore, strongly of opinion that whenever a

patient dies with the diagnosis of toxæmic vomiting, a *post-mortem* examination should be made in order to verify the diagnosis.

With the modern methods of investigation, a mistake in diagnosis is not nearly so likely to occur.

Vomiting due to Pregnancy.

Women who vomit because they are pregnant, and not, as in the first group, in spite of their pregnancy, may be divided into two classes, according to whether the vomiting is due to some disturbance of the nervous system, *neurotic vomiting*, or to some disturbance of the proteid metabolism, *toxæmic vomiting*.

Neurotic Vomiting.—The diagnosis of neurotic vomiting is a dangerous one to make unless one feels certain that the vomiting is not due to some other cause, and so it will be diagnosed rather by a process of elimination. Although some authorities seem to doubt its entity, considering all cases as toxæmic in nature, there appears to be little doubt of its occurrence, otherwise it would be difficult to explain the surprising recoveries which so rapidly follow on the use of some worthless remedy, the effects of suggestion, or a rest cure.

In neurotic vomiting, the tongue remains clear, the temperature normal, but the pulse is raised, and, as a rule, the loss of flesh is not very striking. The vomiting, which not uncommonly induces abortion, ceases when the uterus is emptied.

There is another class of case in this group in which the vomiting is associated with the displacement of the uterus, and ceases when the uterus is replaced. This is classified by some authors as *reflex*.

Toxæmic Vomiting.—Vomiting due to auto-intoxication is in the vast majority of cases only slight, and is known as "morning sickness." Rarely it is severe, and is known as "pernicious vomiting" or hyperemesis gravidarum. The vomiting associated with eclampsia and pyelitis is also toxæmic in character.

Morning Sickness.—Nearly 50 per cent. of primigravidæ suffer from this complaint, due, no doubt, to the fact that the maternal organism is unable adequately to deal at the first time of asking with the extra waste products that are produced by pregnancy. In future pregnancies a certain resistance to the toxins having been established, the morning sickness, unless the waste products are excessive, is not troublesome.

Some authorities maintain that morning sickness is reflex in origin, being due to the stretching of the uterus. To support this view they point out that the first time the uterus is stretched, the more likely is the patient to suffer, and that even in multigravidæ, when the uterus is unduly stretched by twins, hydramnios, or

hydatid mole, morning sickness is often marked, and that the uterus has only to be emptied, that is the stretching removed, for the complaint to vanish.

Morning sickness is more often a nausea than actual vomiting.

Pernicious Vomiting.—Hyperemesis gravidarum or pernicious vomiting is one of the manifestations of auto-intoxication of pregnancy, occurring, as a rule, in the first half of pregnancy, thus differing from the other serious variety of toxæmia, eclampsia, which usually occurs in the last half of pregnancy.

The diagnosis of pernicious vomiting rests upon the clinical manifestations and a careful examination of the urine. If the former are not marked, there may be difficulty in determining whether a particular case is neurotic or toxæmic, but an analysis of the urine should settle the matter. There are two forms: one acute and the other chronic. The origin of the toxin is unknown in either case. Probably it is derived from placental metabolism. The symptoms are similar, but differ in severity and duration. They are as follows:

Acute.—These cases are rare. Death takes place in from ten days to two weeks, or a little longer. Fever is absent, the pulse is not markedly quickened, and the emaciation is not very noticeable. The ammonia coefficient is very high, the quantity of fluid ejected is large in amount and contains blood.

Chronic.—These cases may continue for many weeks, and three stages have been described: Wasting; Pyrexial; and Mental.

Wasting Stage. The patient markedly and rapidly wastes. The frequency of the vomiting varies from several times a day to immediate rejection of any food that is taken into the stomach. Thirst is a very troublesome symptom and abdominal pain is complained of. There are marked changes in the urine, which will be discussed later.

Pyrexial Stage.—After a while the temperature rises to 103° F. or more, and the pulse rate is over 120. The tongue becomes dry and brown, and diarrhœa may supervene.

Supposing abortion occurs, as it may do at this stage, or the uterus is emptied, the patient usually recovers. If, however, neither of these events takes place, then the third stage supervenes, which is practically always fatal.

Mental Stage.—Delirium or coma having supervened, the vomiting ceases or contains blood. Attacks of syncope are common and the patient rapidly sinks.

Urinary Analysis.—The urine of patients suffering from serious toxæmic vomiting is found to be scanty, and may contain albumen, casts, and at times blood. Acetone and di-acetic acid are present. See p. 70.

Further, on an analysis being made to determine the total amount of nitrogen excreted in the form of urea, ammonia, creatinin, uric acid, and undetermined nitrogen, marked variations from the normal are observed.

The ammonia coefficient of the urine, *i.e.*, the percentage of the total urinary nitrogen that is passed in the form of ammonia, varies between 3 and 5 per cent. in a healthy person on an ordinary mixed diet.

If the urine of a patient with toxæmic vomiting be analysed, the ammonia coefficient is found to be raised to 10 per cent., 15 per cent., and even up to 30 per cent. If the matter rested here, one would be able to state with certainty that a particular case was toxæmic or not, and for some time the ammonia coefficient was regarded as the key to the diagnosis. It is, however, known that if a patient is put upon a proteid-free diet, the ammonia coefficient rises and comes as high as it is found to be in many cases of toxæmic vomiting. The same increase is noted in people who fast from disease, or from choice, as in the professional fasting men. This fact, therefore, discounts very considerably the value of the ammonia coefficient as an index to the cause of the vomiting, since persistent vomiting brings about a similar set of conditions as fasting, and the increased ammonia coefficient may be due to the fasting and not to the toxæmia. Nevertheless, such an analysis of the urine, as has been indicated, is of great clinical use, for a marked increase in the ammonia coefficient shows that the patient is at all events either being poisoned or being starved. The estimation to be of value must be carried out by a chemist, expert in such work.

PROGNOSIS.

The prognosis of vomiting associated with pregnancy depends entirely upon the cause, and of vomiting due to pregnancy upon the variety, so that morning sickness, except for the discomfort, or the fact that it may develop into a more serious variety, is of no account. Neurotic vomiting is as a rule without danger except for the child, but pernicious vomiting is a very dangerous disease, the maternal mortality being over 50 per cent.

When a woman who is pregnant complains of vomiting, the first thing to do is to take out her history, then examine her very carefully, and, lastly, to thoroughly investigate her urine.

By such means it may be discovered that the illness is due to disease in some organ of the body, other than the uterus, when it can be treated accordingly.

In the absence of such a diagnosis, the vomiting must be attributed to the pregnancy.

DIFFERENTIAL DIAGNOSIS.

In the diagnosis between neurotic and toxæmic vomiting, the fact that the urine contains albumen, casts, and perhaps blood, may be regarded as pointing very strongly to a toxæmic origin, and if in addition there is fever, and the ammonia coefficient is found to be markedly increased, and acetone and diacetic acid are present, these are additional points in favour of such a diagnosis.

TREATMENT.

Morning Sickness.—Supposing the vomiting is slight (morning nausea or sickness as it is termed), the patient should stay in bed for breakfast, her bowels should be kept acting well, a gentian or bismuth mixture may be given, and immediately on waking she should drink a cup of milk which has been placed by the bedside overnight.

This is the usual routine treatment, and if it fails it will often be found that further treatment by drugs is unavailing, and that the patient either has to put up with the annoyance or submit to very strict dieting with absolute rest in bed.

The treatment with drugs, of vomiting due to pregnancy, is very unsatisfactory, as will be seen when one considers that nearly every drug in the Pharmacopœia has from time to time been vaunted as a specific. Occasionally one or other of these drugs will afford relief, but probably these cases are neurotic in nature and the successful result is due to suggestion.

Among the drugs that have been successful are the following: Oxalate of Cerium in 10-gr. doses; Vinum Ipecac., 5 min. in an ounce of water every four hours; Creasote, 1-min. doses in a teaspoonful of glycerine; Liquor Arsenicalis in small doses; Bromides of Potassium and Sodium in large doses; Veronal, 30 gr. by the rectum; Chloral, 20 gr.; Nitrate of Silver, $\frac{1}{4}$ gr., in capsules containing Pepsin (2 gr.), Menthol (2 gr.); Cocain in small doses; Chloretone; Oxygen.

If the sickness does not react to the measures mentioned, the patient should be kept absolutely at rest.

At first she should be fed with small quantities of milk, say an ounce, at frequent intervals (the milk may be peptonised, lime-water may be added, or it may be iced); small quantities of Brand's essence, and Somatose, Sanatogen, or Plasmon may be given in addition. At times iced champagne may stop the vomiting.

These measures failing, all food by the mouth should be stopped, and rectal saline infusion substituted (6 oz. every four hours).

Pernicious Vomiting.—If the urine contains albumen, casts, or perhaps blood, and an analysis shows that the ammonia coefficient is increased, the question of inducing labour presents itself.

If the urinary changes are not very marked, and the clinical signs have not advanced beyond the "wasting stage," rectal injections containing 1 drachm of bicarbonate of soda and 4 drachms of glucose to the pint may be administered, and nothing given by the mouth.

The subcutaneous injection of cacodylate of sodium (7 gr. in 2 drachms of water for seven days running, and then intermitting for a like period) has been successful, also the following treatment recommended by Dumat:

1. Washing the stomach out with copious draughts of warm water every morning.

2. Administering potassium permanganate in cachet 2 to 4 gr. in 4 oz. of water, and after this has been in the stomach for twenty minutes, giving a pint of warm water to empty the stomach.

3. Giving thyroid extract (5 gr.) three times a day.

By these measures he contends that he washes the poison out, breaks it up, and prevents its further formation.

The administration of horse serum in doses of 20 c.c., repeated as may be necessary, has apparently been successful in arresting the vomiting in some cases.

Ten drops of 1 in 1000 adrenalin may be given in normal salt solution and has proved successful.

If, however, in spite of such measures, the patient continues to get worse, the ammonia coefficient is increasing or is high, say over 10 per cent., and the clinical signs and symptoms of the "fever stage" are marked, labour should be induced. It must be particularly remembered that whereas pregnancy may be terminated while there is really no reason, on the other hand it has happened that labour has been induced too late, and the patient has died in spite of an empty uterus. The patient may be so anxious for a child that she may refuse to submit to induction till it is almost or quite too late to save her life.

Neurotic Vomiting.—If the vomiting is serious but the clinical signs do not progress beyond the wasting stage, if the urine is to all intents and purposes healthy, and if no other cause for the vomiting can be discovered, then the vomiting may be ascribed to neurosis.

The patient should then be treated by a modified rest cure, being

carefully isolated from all her relatives and massaged. Rectal salines with bicarbonate of soda and glucose should be administered, as above described, and when the vomiting has ceased the ordinary diet may gradually be resumed. Such patients may also be treated by suggestion, hypnotism, electricity, whilst local applications to the cervix or slight dilatation of the os uteri, a procedure suggested by Copeman, is at times successful. Before dilating the cervix the practitioner should, however, hold a consultation, for this treatment may eventuate in the uterus emptying itself.

The treatment of these neurotic cases is a very difficult problem and requires the nicest judgment on the part of the practitioner, who has to remember that the patient may not want a child and may be keeping up the vomiting in an endeavour to force his hand, or she may appear to be suffering so acutely that she or her relatives may insist as far as they are able on induction. Few of these cases really require induction, but in the last resort it must be performed.

INTESTINAL OBSTRUCTION.

CAUSES.

Cases of intestinal obstruction during pregnancy may be divided into two classes :

1. Those in which the pregnancy is the determining cause, and
2. Those in which the cause is accidental and bears no relation to the fact of pregnancy.

Intestinal Obstruction due to Pregnancy.

Adhesions.—The enlargement of the pregnant uterus may under certain circumstances produce pressure upon or constriction of the bowel. Thus adhesions between the intestine and other parts which up to then had given rise to no symptoms may be pulled upon as the uterus rises in the abdomen.

An interesting and unique example of intestinal obstruction due to pregnancy occurred in the practice of one of us, in which the ascending uterus dragged upon and eventually obstructed a Meckel's diverticulum, which adherent at its free end to the abdominal parietes passed through a hole in the mesentery just beyond its origin from the ileum.

The patient had been twice pregnant. On the first occasion induction of labour was performed owing to vomiting which was thought to be toxæmic. On the second occasion this symptom recurred at a somewhat later date and under the same misapprehensions, and action was unfortunately delayed too late, the patient dying in spite of delivery.

It is specially to be noted in this case the classical symptoms of obstruction in the continuity of the intestinal tract were necessarily absent. The following are the notes of the condition found on *post-mortem* examination:

"Immediately above the uterus was a coil of ileum running transversely, and from its free border where it crosses the middle line a Meckel's diverticulum comes off, which passing downwards and backwards traverses an elliptical hole of congenital origin in the mesentery. The diverticulum then passes up behind the intestine, coils over it and becomes adherent through the parietes and omentum in the neighbourhood of the right internal abdominal ring. That part of the diverticulum which intervenes between its origin from the ileum and the point where it passes through the hole in the mesentery is greatly thinned as though by traction and exactly at the point where it turns round the sharp upper border of the mesenteric hole, in the same manner as a rope plays round a pulley, it is gangrenous. There are some filamentous adhesions at this point and two or three collections of pus. The rest of the diverticulum is distended with gas to the size of the small intestine. The remaining organs are normal. The gangrenous condition of the diverticulum is due to the growing uterus pushing up the coil of ileum above it, and this in its turn dragging up the diverticulum has lengthened it and eventually caused gangrene."

Fibroids and Ovarian Tumours.—A fibroid of the uterus may enlarge so rapidly when the patient becomes pregnant as to cause serious pressure on the intestine, especially if incarcerated in the pelvis. The united bulk of a pregnant uterus and an ovarian tumour may produce the same result.

Extra-uterine Gestation.—Extra-uterine gestation in the later months may cause serious interference with the action of the bowel.

Direct Pressure.—The pressure of the pregnant uterus on the pelvic colon has caused intestinal obstruction, nothing further being found to account for it on abdominal operation.

Paretic Obstruction.—A degree of flatulent distension due to atony of the bowel is not uncommon after delivery. Occasionally it may be excessive or even alarming in amount. Very rarely complete obstruction may be caused with regurgitant vomiting and other symptoms of that condition. Death has even occurred.

Intestinal Obstruction associated with Pregnancy.

Turning to the second group, a pregnant woman may suffer from a strangulated hernia, a volvulus, or an intestinal growth just as

one not pregnant. A pelvic abscess has also caused intestinal obstruction from coils of intestine becoming adherent to it, as has the stump left after ovariotomy.

These conditions need no further discussion, as they are dealt with in general surgical text-books.

DIAGNOSIS.

The diagnosis of intestinal obstruction is rendered more difficult by pregnancy, especially in the later months. Where pregnancy is itself the determining cause, a period of partial obstruction with attacks of vomiting, abdominal pain, and frequent small loose stools usually precedes the symptoms of complete blockage.

Where, however, the pregnancy is merely coexistent the symptoms may begin acutely, as, for instance, in the event of a strangulated hernia. These are the more easy cases to recognise.

In making a diagnosis, the usual *criteria* of intestinal obstruction should be sought for as in a case not pregnant.

The most important point in the diagnosis is the distinction of obstructive vomiting from the pernicious toxic vomiting of pregnancy. In this connection it is to be remembered that pernicious vomiting (1) begins early in pregnancy and steadily gets worse; (2) its onset is rarely acute; (3) it is not associated with pain, distension of the bowels, or interference with the passage of flatus; (4) it may be relieved by prohibiting ingestion by the mouth; and (5) the urinary analysis in certain cases will show the characteristics dealt with on pp. 32 and 33. Where the reverse of these conditions obtains, intestinal obstruction should be suspected.

TREATMENT.

The treatment obviously varies according to the nature of the case. When pregnancy is merely a complication and not the cause of the obstruction, the surgical measures appropriate to the condition should be carried out irrespective of the gestation. Where, however, the pregnancy is held to be the cause and the symptoms as yet are only those of partial obstruction, evacuation of the uterine contents either operatively or by induction would appear at first sight to be indicated.

The drawback to this course is that it is impossible in many cases to be sure as to the part played by the uterus, and thus the symptoms may fail to be relieved after the pregnancy has been terminated; while, further, the condition except for the reduced size of the uterus remains unaltered, so that the symptoms are likely to return with the next pregnancy. In certain obstructive states such

as an impacted myomatous gravid uterus, the alternative of endeavouring to push the tumour out of the pelvis has to be considered. Pushing a myomatous uterus out of the pelvis is a justifiable proceeding in certain cases; but we are of opinion that when the impaction has reached such a grade as to seriously obstruct the intestine, the removal of the tumour is urgently called for, see p. 188.

In general, then, when the pregnancy is probably or positively the cause of partial obstruction, abdominal section is the best course, for, by adopting it, it may be found possible to remove the obstructing agent without disturbing the pregnancy as in the case of an adhesion or impacted tumour.

Turning to acute obstruction, it is obvious that evacuation of the uterus *per vaginam* is not indicated even though the pregnancy be considered to be the cause of it. These cases are so gravely ill that immediate relief to the distended bowel is imperative. In a patient almost moribund, the least severe surgical measures compatible with this object will have to be employed, and in this event the simple operation of cæcostomy or colostomy must alone be performed. If improvement follows, the actual cause of the obstruction can be dealt with later by another abdominal operation.

In a case less urgent than this, the actual cause must be attacked, the pregnant uterus being spared if this can be done safely. If, however, its removal is called for and the child is viable, Cæsarean section should first be carried out.

If cæcostomy or colostomy is performed whilst the pregnancy is still some months from term, and the nature of the obstruction is such that the artificial anus will have to be maintained for some time, it is inadvisable to let the gestation continue, because the ascent of the uterus will probably produce injurious traction on the anchored gut. The general treatment of intestinal obstruction is discussed on pp. 696—697.

APPENDICITIS.

Appendicitis complicating pregnancy or the puerperium is not nearly such an infrequent event as was formerly supposed when the diagnosis of this disease was less exact and its treatment less efficient.

Although pregnancy does not predispose to an attack of appendicitis *de novo*, apart from the constipation associated therewith, it is quite certain that the growing uterus may, by pulling upon and disturbing adhesions formed by a previous attack, excite a renewal of the disease.

DIAGNOSIS.

Abdominal pain in a pregnant woman may be due to uterine contractions, pyelitis, appendicitis, or to other more obscure causes of peritonitis, see p. 96.

In pain due to beginning labour or miscarriage, if pregnancy is sufficiently advanced, the uterus can be felt to contract, whilst the occurrence of hæmorrhage would point to the cause.

Appendicitis is at times a very difficult complaint to diagnose in a pregnant woman, and its symptoms may be attributed to a pyelitis, although as a rule the opposite obtains. In the latter circumstances patients have been explored and a healthy appendix discovered, see p. 62.

Pyelitis is indicated by the condition of the urine.

On two occasions patients have been sent to us for an immediate operation on the assumption that the case was one of acute appendicitis, in whom an examination of the urine, by disclosing B. coli infection, satisfied us that such an operation was not indicated.

The vomiting of appendicitis may be attributed to that of pregnancy, but the sudden onset, rapid pulse, and rise of temperature should prevent this mistake from being made. A sudden attack of appendicitis may cause symptoms somewhat similar to an extra-uterine gestation, whilst if a blood count is taken the leucocytosis of appendicitis may be attributed to that of pregnancy.

Again, in the fulminant cases where the picture is one of "acute abdomen," other conditions setting up peritonitis and pelvic abscess must be considered, see p. 77.

The ease with which the diagnosis will be made will also depend upon the size of the uterus, since, except in the very early months of pregnancy, the enlarged uterus will prevent adequate palpation. A rise of temperature associated with vomiting, constipation, and localised and well-marked rigidity in the region of the appendix will, however, usually point to the source of the trouble. In this connection it may be noted that the pregnant uterus tends to raise the cæcum and appendix.

The history of previous attacks may also be of help in arriving at a diagnosis.

If appendicitis supervenes during the puerperium, the case may be erroneously regarded as one of "puerperal sepsis." Thus in one case we have knowledge of, a very acute attack of appendicitis appeared on the third day after labour which had been induced for contracted pelvis. The temperature suddenly rose to a high degree and there was great abdominal pain accompanied by sickness.

Puerperal sepsis was suspected, but later appendicitis was diagnosed, the organ removed, and the patient recovered.

PROGNOSIS.

If a patient has had appendicitis and then becomes pregnant, the result very largely depends upon when she had the attack; if some time before the pregnancy, then most likely nothing will happen. On the other hand, if she became pregnant soon after an attack, it is possible that the growing uterus might disturb some of the adhesions and initiate another attack. Supposing a pregnant woman has an attack of appendicitis, the outlook is more grave than usual, since pus formation is commoner and miscarriage is likely to take place. If pus is present, the side of the uterus may form one wall of the abscess cavity, and as the uterus retracts, adhesions may be torn and the pus escape, giving rise to general peritonitis.

TREATMENT.

The treatment may be divided into prophylactic and radical.

Prophylactic.—The arguments in favour of removing the appendix in a woman who has had one attack of appendicitis are greatly strengthened by the fact that she is liable to become pregnant, for, as we have already pointed out, both the liability to and the gravity of an attack are increased by pregnancy. This advice, therefore, should be given to a woman about to marry or in a married woman of the childbearing age.

Radical.—Surgical experience in the non-pregnant teaches one that it is safest to operate upon all cases of appendicitis. If there are signs of pus formation surgical measures should admittedly be at once resorted to, and in our opinion it is also safer to operate upon the mild cases.

The objections advanced against surgical interference in the mild cases are that the child may be sacrificed and the emptied uterus on retracting may break down adhesions, with a resulting general peritonitis. This accident is certainly more likely to happen if the child is delivered before the appendix is removed, as some authorities contend it should be when it is viable.

On the other hand, in many instances the patient has gone to term and delivered a healthy child after the appendix has been removed.

SIGMOIDITIS.

Inflammation of the sigmoid colon has been described as a complication of pregnancy.

SYMPTOMS AND SIGNS.

In this condition the pelvic colon is painful, so that the patient complains of tenderness, rather intermittent in its intensity, in the left lower abdomen. There may be slight fever and the pulse rate quickened, whilst vomiting may be troublesome. There may have been several attacks of diarrhœa.

DIAGNOSIS.

The condition is apt to be mistaken for mucous colitis, and the pain has been considered as due to uterine contractions.

TREATMENT.

The bowels should be well emptied with purgatives, after which belladonna and intestinal sedatives should be given by the mouth and opium by the rectum.

CARCINOMA OF THE RECTUM.

Carcinoma of the rectum is a rare complication of pregnancy, since it does not usually appear till after the period for childbearing has passed.

SYMPTOMS AND SIGNS.

The symptoms and signs of carcinoma of the rectum during pregnancy are those of the disease when occurring apart from this condition, namely, constipation alternating with diarrhœa, hæmorrhage from the bowel, pelvic pain, and rectal tenesmus or frank obstruction. In a patient we had in the Middlesex Hospital the latter was the predominant symptom.

Effect on Labour.

This depends on the stage of the tumour. If the growth is an early one, labour may be terminated without the disease being suspected and without trouble of any kind.

In the majority of reported cases the carcinoma has been more advanced than this and has obstructed labour to a greater or less degree. In some cases this obstruction has been absolute, necessitating the performance of Cæsarean section to effect delivery; in other cases the child has been delivered with forceps without much trouble, whilst occasionally great injury has been inflicted on the mother when this instrument has been used.

DIAGNOSIS.

The diagnosis of carcinoma of the rectum, if at all advanced, does not present any particular difficulties. There is a condition of

so-called "syphilitic" ulceration of the rectum that simulates carcinoma; tubercular ulceration of the rectum may also lead to a similar error. The diagnosis in these cases would be settled by the history of the case, the use of the sigmoidoscope and the removal of a portion of the tissue for microscopical examination.

TREATMENT.

The treatment of a case of pregnancy complicated by carcinoma of the rectum depends upon whether it is considered feasible to surgically remove the neoplasm.

Operable Carcinoma of the Rectum.—Presuming the case is judged as operable, the method by which it is proposed to remove the growth has to be considered.

Trans-sacral Route.—If the trans-sacral route be chosen, the uterus must be emptied beforehand. During the first five months of pregnancy this should be effected operatively under an anæsthetic, but later than this it is best to induce premature labour by means of bougies, see p. 719.

The major operation should be undertaken so soon as the patient has recovered from the effects of the delivery.

Abdominal Route.—If, however, abdominal extirpation be the operation of election, it would appear to be better first to dispose of the pregnancy either by Cæsarean hysterectomy or by subtotal hysterectomy according to whether the child is or is not viable. This is especially true if the pregnancy be far advanced, for the presence of the uninvoluted uterus, which must obtain if the major operation be preceded by labour, will handicap the surgeon.

The operation on the bowel is greatly facilitated, not only by the removal of the uterus *per se*, but also by the great abdominal laxity which follows such removal. These points would more than compensate for the increased extent of the operative procedure as a whole.

Inoperable Carcinoma of the Rectum.—In the case of disease too far advanced for surgical removal, the chief point to be considered is the degree of obstruction likely to be caused by the growth during labour.

As a rule this is slight or none at all, but where a very large mass is present, the descent of the presenting part is likely to be seriously interfered with. In such an event two courses are open to the practitioner according to the advancement of the pregnancy.

Gestation early.—When the gestation is early, the proper course is to evacuate the uterus through the vagina and then under the same anæsthesia to perform colostomy if it be indicated.

Gestation late.—Cæsarean section is now indicated. The operation may be concluded by suture of the uterine incision or by a subtotal hysterectomy, and in either event colostomy might also be performed if it seemed advisable.

Where colostomy has already been performed, abdominal section is rendered dangerous if the artificial anus is foul and suppurating.

When, however, the colostomy wound is in a healthy condition, Cæsarean section may be safely performed, as in the case of a patient under the care of our colleague, William Duncan.

Patient in Labour.—If the patient first comes under notice in labour, and the tumour gives rise to obstruction, Cæsarean section is indicated.

HÆMORRHOIDS.

Hæmorrhoids already existent are made much worse by pregnancy, and not infrequently their origin is attributable to this cause, the constipation which is such a common affection during this period being a contributory factor of some importance.

RESULTS.

The complications of inflammations and bleeding, to which hæmorrhoids are liable, are increased in frequency and severity during pregnancy, whilst in the puerperium acute inflammation often occurs, especially if the perineum has been lacerated far back, see pp. 460 and 508, when fever, pain, and constitutional symptoms may be marked.

TREATMENT.

To relieve the congestion of the lower bowel, it is of the greatest importance to obtain a daily evacuation. This result is best obtained by prescribing mild aperients such as confection of senna, senna pods, cascara sagrada, or compound liquorice powder. Strong aperients must be avoided, as in some women they have a great tendency to produce abortion.

The anal region should be kept scrupulously clean, and a soft sponge substituted for the ordinary sanitary paper. If the hæmorrhoids prolapse they should be immediately returned, and the parts bathed with a cold antiseptic lotion such as boracic acid.

The patient should be advised either to stand or lie, but not to sit if she can help it, as the latter position favours relaxation of the sphincter.

If the hæmorrhoids inflame, rest in bed and frequent warm boracic acid fomentations give great relief.

The prolapsed masses should be first painted with a 10 per cent. solution of cocain, and after being greased with an ointment containing cocain and adrenalin they should be pushed well up above the external sphincter. Hæmorrhage must be treated by rest, and the application of hazeline and adrenalin either by ointment, suppository, or rectal injection. If the bleeding is very severe, as it occasionally may be, the veins will have to be removed, but with this exception the operation is clearly contra-indicated during pregnancy.

ANCHYLOSTOMIASIS.

A woman who is suffering from this disease is severely handicapped by pregnancy, and the outlook may be very grave. Albuminuria appears, there is an increase in hydræmia, and the fœtus usually dies.

TREATMENT.

Miscarriage nearly always takes place, and if it does not the patient's condition may be so serious that pregnancy has to be terminated.

Thymol, eucalyptus, or β. naphthol should be administered to kill the parasites.

CHAPTER III.

Disorders of the Urinary Tract.

ALBUMINURIA.

If albumen is detected in the urine of a pregnant woman its presence may be due to several causes. These can be conveniently divided into two groups:

1. In which the albuminuria is simply associated with pregnancy.
2. In which the albuminuria is due to the woman being pregnant.

Albuminuria associated with Pregnancy.

The albumen in the urine may be due to cardiac disease, or to renal disease, such as chronic nephritis, calculus, tubercle, pyelonephritis, or to cystitis. It must further be remembered that the albumen may be due to contamination from vaginal discharge, so that if there is the least doubt, a catheter specimen should be obtained and tested. The above conditions are dealt with under their respective headings, except chronic nephritis, which will be discussed forthwith.

Chronic Nephritis associated with Pregnancy.—The disease may be due to one of the many causes of chronic nephritis, or to a previous attack of "pregnancy albuminuria," that is, the albuminuria due to pregnancy. Such a *sequela* is distinctly rare, but it occasionally occurs.

The result to a woman who, having chronic nephritis, becomes pregnant may be considered in two ways:

1. The effect of the pregnancy on the kidney disease.
2. The effect of the kidney disease on the pregnancy.

The Effect of the Pregnancy on the Kidney Disease.—On the whole pregnancy decidedly accentuates the symptoms of the renal disease, and, further, the complications which, at all times, may result from chronic nephritis are increasingly liable to occur. Thus, for instance, albuminuric retinitis, or retinal hæmorrhage, may supervene, œdema becomes more marked, so that it affects the face and upper extremities, headache may be very distressing, and sleeplessness may become troublesome. The patient may have an attack of hemiplegia or paraplegia, or she may have pleural effusion, pericardial effusion, or ascites.

The Effect of the Kidney Disease on the Pregnancy.—The child is very likely to die, with the result that abortion or premature labour takes place. The same may result from hæmorrhage into the placenta or membranes, causing in the early months abortion or blood mole, and in the later months accidental hæmorrhage.

There does not seem to be any predisposition to eclampsia in these cases, probably because the organism has become inured to the toxins.

There is a liability for an attack of acute tubal nephritis to supervene on the chronic disorder, and if such occurs, a fatal termination is not at all unlikely.

TREATMENT.

The treatment of chronic nephritis associated with pregnancy does not materially differ from that apart from this condition. Plenty of water should be given for its diuretic effect, the bowels should be kept acting well with saline aperients, and the diet should be a fairly liberal one. For further details a text-book on medicine should be consulted.

In regard to the pregnancy, if the quantity of albumen increases and the patient is obviously going downhill in spite of treatment, the uterus should be emptied, as also it should be if any of the serious complications of chronic nephritis supervene. The practitioner should be particularly on the look-out for albuminuric retinitis, since the patient's sight may depreciate very quickly, and unless pregnancy is terminated, incurable blindness may result. He should therefore examine the eyes of his albuminuric patients at regular intervals.

If a woman has chronic nephritis, she should be advised not to marry.

Albuminuria due to Pregnancy.

The albuminuria caused by pregnancy is of two distinct types, chronic and acute, and although the chronic may pass into the acute as a matter of fact, if properly treated it seldom does so. On the other hand, the acute variety may and generally does come on independently of the chronic variety.

Chronic Albuminuria due to Pregnancy.

The chronic variety is more likely to occur in multiparæ, 69 per cent. of the cases reported by French being of this class.

In this class of case the albuminuria may appear quite early in pregnancy, and cases as early as the second or third month have

been noted. As a rule, however, it first declares itself about the sixth month.

SIGNS.

One of its chief signs is œdema, affecting not only the lower extremities and vulva but the face as well. The vulva in particular may be so swollen that it requires incision. The patient is markedly anæmic and suffers from severe headache and perhaps vomiting. Albuminuric retinitis is much commoner in the chronic than the acute disease and is a sign of some gravity.

Urinary Analysis.—The urinary changes are marked: thus the colour is light, the specific gravity low, the percentage of urea passed per diem is not greatly diminished, and the quantity of urine is above the normal. The amount of albumen depends upon the severity of the disease; it may be a very little or there may be a marked deposit. Casts of the hyaline and granular varieties can be found and blood may be present. The ammonia coefficient is raised and there is evidence of acidosis.

The character of the urine markedly changes supposing the case passes into one of the acute variety.

PROGNOSIS.

About 50 per cent. of the children die, and the children that are born alive are often unhealthy and small. The maternal mortality of this variety is about 5 per cent. There is an increased liability to *post-partum* hæmorrhage, sepsis, and mania.

DIAGNOSIS.

It is important in a pregnant woman to diagnose the albuminuria of chronic nephritis from chronic albuminuria due to her pregnancy, because the treatment and prognosis differ so markedly.

The distribution of the œdema may give a clue. Extreme swelling of the vulva is greatly in favour of pregnancy nephritis. If the albuminuria and œdema appear early in pregnancy the point is in favour of chronic Bright's disease, since pregnancy albuminuria does not come on as a rule till the sixth month.

A patient who has had chronic nephritis for any length of time will have thickened arteries and an hypertrophied heart.

Most of the albumen in chronic nephritis is serum albumen, whilst in pregnancy albuminuria it is paraglobulin.

The value of the ammonia coefficient (see p. 32), should be ascertained and the urine tested for the presence of acetone and diacetic acid. The presence of these substances strongly suggests pregnancy toxæmia, see p. 70.

Lastly, if the case is one of chronic Bright's disease, the albumen will not clear up after delivery, whereas in pregnancy albuminuria it will do so in the great majority of cases.

TREATMENT.

It is most important that the quantity of urine passed and the amount of urea and albumen excreted per diem should be estimated daily.

Pregnancy albuminuria is due to a toxæmia, the nature and origin of which are undetermined. In fatal cases acute degenerative changes are found in the liver and kidneys. The treatment therefore must be directed towards getting rid of poison already present or being formed. Diuretics (a milk diet and large draughts of water), purgatives (jalap), and diaphoretics if necessary (hot baths, hot-air baths) are indicated. Thyroid extract has been advised on the supposition that the essential cause of the disease lies in some abnormality of the thyroid secretion. As a means of reducing nervous excitability, full doses of the bromides should be administered. If, in spite of this treatment, the patient does not rapidly improve, that is, if the amount of albumen does not quickly decrease, if the quantity of urea passed per diem becomes reduced to less than half the normal amount, and if the so-called pre-eclamptic signs, namely, headache, vomiting, and eye symptoms appear, labour should be induced, lest eclampsia supervene.

Acute Albuminuria due to Pregnancy (Eclampsia).

Although acute albuminuria supervenes on the chronic variety in about one in five cases, it generally appears so rapidly that the brief warnings and signs often escape notice. It is particularly associated with and practically always ends in *eclampsia*. As a rule, there is but very little or no œdema present, perhaps a slight trace round the ankles and in the eyelids, thus differing markedly from the chronic variety, in which there is commonly marked œdema but rarely eclampsia.

Over 70 per cent. of the cases occur in primigravidæ. The disease appears nearly always in the last two months of pregnancy and becomes commoner the nearer the time for delivery, so that, in the majority of cases, it occurs during or just before labour. A certain number of cases follow labour.

CLINICAL MANIFESTATIONS.

These can be divided into three periods:

1. The pre-eclamptic period.

2. The eclamptic period.
3. The post-eclamptic period.

The Pre-eclamptic Period.—Before the fit actually occurs there are in nearly every case certain definite though brief warnings, the appearance of which should arouse the greatest suspicion.

The patient may complain of headache, nausea, vomiting, diarrhœa, giddiness, epigastric pain, or some disturbance of vision such as amblyopia, diplopia, hemianopsia, or flashes of light. The blood pressure is high and is nearly always over 150 mm. of mercury. The epigastric pain is a most significant symptom. We remember a case in which it was the *only symptom* in a patient who had been apparently in the best of health all through her pregnancy. The pain, which lasted for two days, was diagnosed as dyspeptic; the patient then had one eclamptic fit and died comatose in a few hours.

There may be œdema present: the amount rather depends as to whether the acute stage was preceded by a chronic one; if so, it will probably be marked. If, on the other hand, the acute stage has come on suddenly, there will be only slight œdema, or none at all. Jaundice may be present and is a very grave symptom, indicating as it does acute hepatic degeneration.

Urinary Analysis.—The patient may or may not have noticed that the quantity of urine she is passing is markedly decreasing and also that its colour has altered. The practitioner on examining the urine will find that it is high coloured or perhaps smoky from blood and has a high specific gravity. On testing it there is a very large quantity of albumen present; in fact, it is not unusual for the urine to "go solid" on boiling. On a microscopical examination cellular, granular, and fatty casts are found, while a quantitative estimation of the urea shows that the percentage of this substance instead of being 2 per cent. has fallen in some cases to a decimal point. Bile may be present.

Eclamptic Period.—If these pre-eclamptic warnings are missed and the patient not treated, the eclamptic stage supervenes, as indeed it may do in spite of all treatment.

The eclamptic stage consists of a fit or a series of fits, and is divided into four stages:

1. Preliminary.
2. Tonic.
3. Clonic.
4. Coma.

It is not necessary to discuss at all fully these different stages, but a few words are required concerning the first and last of these.

During the preliminary stage there are very fine contractions of the muscles of the face and limbs, there is conjugate deviation of the head and eyes, and the pupils contract. It is important to notice this stage because the immediate administration of chloroform may stop or diminish the severity of the fit.

After the convulsion has ceased the patient is always unconscious. She may remain in this condition only for a few minutes, and on regaining her senses is for a little while somewhat muddled, or she may remain comatose till the next convulsion, or, as in the case already mentioned, the patient may pass from the first convulsion into the coma of death.

Rarely violent resistive delirium may be present.

It is not necessary for the four stages of the fit to be so plainly divided.

During the eclamptic stage the urine is often suppressed or nearly so.

Post-eclamptic Period.—If full consciousness is regained, which at times may take some days, it is found that the patient's memory is deficient, so that she remembers nothing about her illness and is surprised to find that labour is over. She may in addition have lost her memory for other events, and this may last for weeks or even months.

Some patients' minds become affected so that they develop puerperal insanity. Jaundice is a rare accompaniment of the eclamptic or post-eclamptic periods.

Urinary Analysis.—A careful examination of the urine must be made daily, and if the patient is getting better it will be found that the quantity of urine markedly increases, as does also the percentage of urea. The amount of albumen rapidly decreases, so that in a few days it may have disappeared, though more often there remains a trace for some little time, and rarely due to the supervention of chronic nephritis this remains permanently.

DIAGNOSIS.

The eclamptic stage of acute pregnancy albuminuria has to be diagnosed from the other fit-causing diseases associated with pregnancy, which are as follows: Epilepsy, cerebral hæmorrhage, meningitis, diabetes, hysteria, and drunkenness.

PROGNOSIS.

Eclampsia is a very serious disease, its average mortality being about 25 per cent. The prognosis in individual cases depends on the following factors: The time of onset, the number of the fits, the

degree of fever, the condition of the urine, and the condition of the pulse.

Time of Onset.—Eclampsia developing in pregnancy has the gravest prognosis, and the earlier in pregnancy it appears the more serious are its results. Lower than this in the scale of gravity is eclampsia during labour, and here again, the earlier in labour it comes on, the worse the prognosis. Eclampsia occurring after labour is the least dangerous.

Number of Fits.—Whilst we have seen a patient die after one single fit, it is true as a general rule that the larger the number of fits, the greater the risk, and although patients have recovered even after 100 fits, it may be taken that any number over twelve places the case at once in the very serious class.

Condition between the Fits.—If the patient remains totally unconscious and insensible between the fits, the case may be looked upon as a grave one, still more if the fits are continuous.

Condition of the Urine.—The most important point about the urine with regard to the immediate prognosis is the quantity. In very bad cases where there are a large number of fits, the urine may be suppressed or almost so, and this is a very bad sign. From the point of view of remote prognosis, if after the cessation of the fits the amount of urine and the percentage of urea do not rapidly increase, these are bad signs. With regard to the amount of albumen, this is not of the greatest importance for immediate prognosis, since, although in the majority of cases there is a large amount of albumen, cases are occasionally reported where the albumen is either very small in quantity or entirely absent. We have knowledge of a patient who had eclampsia and œdema of the legs, vulva, and lower abdomen and who presented no alteration in the urine as regards quantity passed or urea excretion, and no albumen, although it was tested repeatedly by various and delicate tests. This patient had one fit during labour, one after, and died. The ammonia coefficient unfortunately was not estimated, neither the total excretion of nitrogen.

The amount of albumen, generally speaking, however, is of prognostic importance as regards the ultimate recovery of the patient, since it should clear up in a short time after delivery; if it does not, it signifies as a rule that the disease has passed on to one of chronic nephritis.

Condition of the Pulse.—A pulse which is rapid and small during the attack, and which does not improve, makes the prognosis very grave.

Condition of the Temperature.—The temperature during

eclampsia is generally somewhat raised, in a few cases it rises rapidly to 106 or more, and this hyperpyrexia, if it cannot be controlled, is a sure sign of the end.

COMPLICATIONS AND CAUSES OF DEATH.

During the eclamptic stage the patient may have an attack of cerebral hæmorrhage, and this with the resulting paralysis is of very serious prognosis. Œdema of the lungs or pneumonia may also supervene, pointing to a fatal termination. Jaundice is a bad sign when associated with eclampsia, and if, as sometimes happens, it is associated with the symptoms of acute yellow atrophy, it may be regarded as a fatal one. Death during a fit may be due to asphyxia or exhaustion.

SEQUELÆ.

Patients who have had eclampsia are liable to the further complications of puerperal insanity, puerperal fever on account of the operative manipulations, and, as already mentioned, chronic nephritis.

TREATMENT.

The methods of treatment of acute pregnancy nephritis at the disposal of the practitioner are as follows: Diuretics, diaphoretics, saline infusion, venesection, purgatives, nerve sedatives, anteeclamptic drugs, induction of labour, and artificial delivery.

Diuretics.—The best diuretic is water, administered either by the mouth, bowel, cellular tissue or veins. Diuretic drugs are probably quite useless.

Diaphoretics.—Sweating may be induced by a hot-air bath, hot pack, and pilocarpine. It has been urged with much cogency that profuse perspiration tends to concentrate the toxins in the body fluids; for this reason, if sweating is encouraged, the fluid thus lost should be more than made up by injection or infusion.

Pilocarpine is said to cause œdema of the lungs, but it has had no such effect in our experience. It may be given if the hot-air bath does not produce the desired effect.

Saline Infusion.—The various methods of introducing saline solution into the body are described on pp. 505 and 706.

In these cases the intra-venous method is most useful.

Venesection.—Venesection is indicated in the presence of marked cyanosis, and is best combined with saline infusion for the purpose of diluting the toxins in the blood.

Nerve Sedatives.—The object of these is to reduce the sensitive-

ness of the cortical cells, and so prevent or lessen the severity of eclamptic convulsions, which in themselves, quite apart from the toxin, severely tax the patient's resources. The best of these is morphia given in full doses, $\frac{1}{3}$ to $\frac{1}{2}$ gr.

Chloroform is absolutely contra-indicated in any acute toxic condition and particularly in eclampsia. It is very apt to precipitate acute degeneration of the hepatic cells.

Chloral and bromides are principally useful in the pre-eclamptic stage, and can be given by the rectum in full doses.

Ante-eclamptic Drugs.—Veratrum Viride, in doses of 10 to 20 min. given subcutaneously every half-hour until the pulse is below 60 to the minute, has been much praised.

Jardine speaks still more highly of its active principle Veratrone. This drug, which can be procured from Parke, Davis & Co., is injected hypodermically in doses of 1 c.c. A very rapid fall in the pulse rate is produced. Occasionally alarming depression occurs, but is remediable by a hypodermic injection of strychnine, gr. $\frac{1}{30}$. The use of veratrone does not contra-indicate the use of morphia.

Thyroid Extract, in doses of 20 gr. every four hours until symptoms of thyroidism result, has been advocated principally on the assumption that the eclampsia is due to a deficiency of the thyroid gland.

Induction of Labour and Artificial Delivery.—The various methods of performing these operations are described on pp. 658, 700, and 711. Their exact application to cases of eclampsia will be presently discussed.

The indications for the use of these several methods depend upon whether the individual case is in the pre-eclamptic or eclamptic period.

Cases in the Pre-eclamptic Period.

Before Labour.—When the symptoms and signs of the pre-eclamptic period have declared themselves before labour, this should be induced or the uterus emptied operatively. As, however, any operative manipulation is liable in these patients to precipitate an eclamptic fit, it is also necessary to diminish the nervous excitability and dilute the toxins as far as may be possible. These auxiliary measures should be carried out either beforehand or coincidently with the main object.

Method of Induction.—Labour may be induced by bougies or de Ribes' bag, and which of these measures is chosen depends upon the severity of the case. Thus, when the pre-eclamptic symptoms are slight so that headache and vomiting are the most noticeable,

the use of bougies, coupled with the secondary measures presently to be described, are indicated. On the other hand, when the symptoms are severe so that the quantity of urea is markedly diminished, and there is partial suppression of urine, greater rapidity is required, and de Ribes' bag will have to be resorted to. These methods of inducing labour are described on p. 719, to which the reader is referred. An anæsthetic should be administered whichever method is employed, and ether should always be chosen.

Auxiliary Methods.—Pending the preparation for induction, the patient in slight cases should be given a strong purgative; she must be kept at rest, and a hypodermic injection of morphia, $\frac{1}{4}$ gr., should be administered. After the bougies have been inserted the patient must be encouraged to drink large quantities of water; or if vomiting renders this impossible and the purgative has acted, 10 oz. of saline infusion should be injected into the rectum every four hours.

During the time that elapses before the child is born, the patient should be kept under the influence of bromides, or in severe cases half a grain of morphia should be injected, and saline infusion should be given subcutaneously or directly into the vein when the patient is under the influence of the anæsthetic. After the bag has been introduced the patient should be placed in a hot-air bath or hot pack, and during the progress of the labour the patient should be kept under the influence of morphia.

Operative Evacuation of the Uterus.—Where the pre-eclamptic symptoms are very marked and the patient appears to be momentarily in danger of the onset of a fit, we believe that operative evacuation of the uterus is a more correct proceeding than induction of labour. This may be carried out either by abdominal or vaginal Cæsarean section, see pp. 658 and 700. In our opinion the abdominal route is the best, as being quicker, easier, and more aseptic. One of us carried out this proceeding on a patient twenty-four weeks pregnant, with the result that the symptoms of a most acute pregnancy intoxication entirely disappeared forty-eight hours after the operation.

During Labour.—If the pre-eclamptic symptoms declare themselves during labour, this should be accelerated, if necessary, by one of the various methods about to be enumerated.

With a patient in the pre-eclamptic state any operative manipulations that may be necessary during labour must be conducted under ether anæsthesia.

After Labour.—When the pre-eclamptic symptoms begin after labour the treatment is much more simple, and consists in the

application of those measures which we have previously termed auxiliary. Of these morphia and saline infusion are the most important.

Cases in the Eclamptic Period.

Patients suffering from eclampsia may be roughly divided into three classes, according to their condition when the practitioner first sees them:

1. That in which the patient has had a fit but is now conscious.
2. That in which the patient has had one or more fits and is in a condition of continuous coma or resistive delirium.
3. That in which the convulsions occur practically with no intermission (status epilepticus),

and the treatment of each of these classes will be modified according to whether the patient is in labour or not.

Before Labour.—Fits followed by Consciousness.—In such a case as this labour should be immediately induced by means of de Ribes' bag under ether anæsthesia, during which a saline venous infusion should be given, or failing this an injection may be given *per rectum* or subcutaneously. During the expulsion of the bag the patient is kept under morphia, and diaphoresis encouraged by the hot-air bath or pack.

On expulsion of the bag the further course to be pursued will depend upon the condition of the patient. If no more fits have occurred, and her general state is satisfactory, labour may be left to terminate naturally.

In the reverse conditions, however, an anæsthetic must be administered and the labour terminated by forceps, breech traction, or perforation as occasion demands.

Continuous Coma.—These are grave cases, and no single method of treatment is applicable to them all, except the auxiliary methods already indicated.

Where expert assistance cannot be commanded the safest treatment is to introduce a de Ribes' bag, and hasten the dilatation by attaching a 2-lb. weight to it. On expulsion of the bag the child should be delivered as quickly as possible, perforating its head if necessary. There are three alternatives to this method, namely, rapid dilatation of the cervix, vaginal Cæsarean section, and abdominal Cæsarean section.

1. The cervix may be rapidly dilated by the hand or by mechanical dilators. Such a method of treatment, however, has certain drawbacks on account of the rigidity of the cervix so frequently met with in these cases, and we do not think its use is

indicated before labour has commenced. The dilatation, if it is carried out, should be followed by rapid delivery of the child.

2. If the child is premature and not more than seven and a-half months, it may be delivered very quickly by vaginal Cæsarean section followed by perforation.

3. Abdominal Cæsarean section is the quickest method of delivery for children at term or close approaching it.

We are of opinion that where this operation can be properly carried out, this is the best method of treating these cases. The uterus should be allowed to bleed and a carbonate of soda solution should be infused, a drachm to the pint.

Continuous Convulsions.—These are the gravest cases, and the majority will die whatever treatment is adopted.

Status epilepticus is fortunately so rare that no single individual can claim much experience of it. In our opinion what hope there is lies in forcible delivery. If the child is premature, vaginal Cæsarean section followed by perforation should be adopted. Towards or at full term the classical Cæsarean operation is the method of election.

In these cases extreme cyanosis is always present and some method of blood-letting is indicated.

This may be effected by venesection or by permitting the uterus to bleed during the operation.

During Labour.—Fits followed by Consciousness.—Half a grain of morphia should be injected immediately. Directly the cervix is sufficiently dilated, the child should be delivered forthwith under an anæsthetic by forceps, breech traction, perforation or version, according to which of these appears most suitable. A subcutaneous or saline venous infusion should be given in addition.

Continuous Coma.—The object now is to dilate the cervix as quickly as possible so as to deliver the child. This may be effected by Bossi's dilator, by the hand, by traction on a de Ribes' bag, or by version and traction on the half breech.

If the os will easily admit the hand, we think internal version to be preferable, and the birth of the child may be further accelerated by perforation of the after-coming head. If the cervix will not admit the hand, the best course in most cases is to introduce a de Ribes' bag and pull upon it. If the practitioner has not got a bag he may be able to perform bipolar version or adopt manual dilatation. In cases of great cervical rigidity Bossi's dilator, incision of the cervix, or Cæsarean section is indicated better still.

In addition, the auxiliary methods already mentioned should be employed.

Continuous Convulsions.—The treatment is the same as indicated in the last section.

Remarks on Artificial Delivery.—The methods of artificial delivery just referred to obviously demand a higher degree of manipulative skill than the introduction of de Ribes' bag, and this is especially the case in vaginal Cæsarean section. As such, therefore, they are not useful to the average practitioner, who, though he may possess the requisite skill, is not as a rule able to command the necessary assistance. Vaginal Cæsarean section is certainly a procedure only to be carried out under the conditions of an operating theatre, and in any case we would not recommend this operation in a primigravida at term.

Abdominal Cæsarean section has been but little used in the treatment of eclampsia in the past, but there appears a probability that its practice will become more common in the future. Under modern conditions it certainly conjoins the most rapid method of delivery with a very moderate risk as far as the operation itself is concerned.

There are three definite indications for it in this connection, namely, rigidity of the cervix, contracted pelvis, and central placenta prævia combined with a rigid cervix.

As regards vaginal Cæsarean section, there is one definite indication, namely, rigidity of the cervix so great as to render the introduction of a bag difficult, the child being premature.

In general when deciding between delivery by means of a bag and a cutting operation, there is always this point to bear in mind, that where a patient is very ill rapid evacuation of the uterine contents is productive of considerable shock.

HÆMATURIA.

CAUSES.

The appearance of blood in the urine of a pregnant woman may be due to the toxic nephritis of pregnancy, to chronic nephritis, to tubercular nephritis, to pyelitis, or to renal calculus, or it may come from the bladder as a result of vesical calculus, of a septic or tubercular cystitis, of ruptured varicose veins, of villous tumour, or of malignant disease.

DIAGNOSIS.

The urine of nephritis contains an amount of albumen out of all proportion to the blood contained therein. The urine of pyelitis contains some pus, and there are besides other signs pointing to the condition, see pp. 61 to 63. A renal calculus can be excluded by

X-ray examination. Tubercular nephritis is rare in pregnancy and can be diagnosed by a bacteriological examination of the urine.

If the blood comes from the bladder it is much brighter in colour and less mixed with the urine. If cystitis exists the urine will probably be alkaline and contain pus as well as blood, and micturition will be frequent and very painful. A definite swelling may be felt in the case of a calculus or new growth. In a doubtful case, the cystoscope should be used; thus early tubercular ulceration of the bladder which gives rise to very few symptoms may at once be recognised. If the bladder is found free of disease, the ureters should be catheterised and the urine drawn from each kidney examined.

In certain cases no evidence of a lesion either in the kidneys or bladder can be obtained.

The term "pregnancy pyelorrhagia" is given to such. The blood probably comes from the pelves of the kidney, but the reason is unknown. The bleeding usually begins after the fourth month, and may continue on and off till term, but it ceases after labour. It is rarely severe, and requires no treatment beyond rest and the administration of the chloride or lactate of calcium. The treatment of the other causes of hæmaturia is discussed under their respective headings.

RENAL CALCULUS.

Given that a pregnant woman has pain in the loin with an abnormal condition of the urine, the question arises as to whether she is suffering from renal calculus, the pyelitis of pregnancy, or tubercular disease of the kidney.

An X-ray examination of the kidney should disclose the stone. Apart from this, calculous pyelitis is particularly associated with the presence of blood in the urine, and with the history of attacks of renal colic. Massive enlargement of the kidney is probably due to calculous pyonephrosis, and this is the more likely if the urine is free of pus.

High fever, especially rigors, in the absence of any marked enlargement of the kidney, is strongly in favour of pregnancy pyelitis.

With regard to the character of the urine, if a bacteriological examination discloses the presence of staphylococcus or streptococcus, the case is probably not one of pregnancy pyelitis. A large quantity of pus and little or no fever suggests a calculus, whereas a small quantity of pus and marked fever is very characteristic of pregnancy pyelitis.

A patient already the possessor of a renal calculus is likely to have the symptoms made worse by the supervention of pregnancy, owing to the enlarging uterus. With regard to tuberculous kidney, an examination of the urine will disclose the tubercle bacilli.

The patient may be known to have a renal calculus before she becomes pregnant, or it may first declare itself during this period.

TREATMENT.

The treatment of renal calculus should proceed on the usual lines. If the state of the kidney is such that its surgical treatment can be properly deferred until the child is born, this should be done. If, however, an operation on the kidney is urgent, the pregnancy must be terminated if the proposed surgical procedure is thereby facilitated, for the presence of a gravid uterus in the later months would seriously hamper any transperitoneal operation on the kidney.

TUMOURS OF THE KIDNEY.

Tumours of the kidney complicating childbearing must be extremely rare from the few cases recorded. They would have to be treated on the usual lines, irrespective of the gestation.

A case has been published in which cystic disease of the kidneys was complicated by pregnancy toxæmia. The kidneys suppurated and the patient died.

MOVABLE KIDNEY.

As a rule a floating kidney causes no trouble during pregnancy. On the contrary, some of the symptoms may be alleviated by the support given by the growing uterus. Occasionally it has happened that such a kidney has undergone axial rotation during pregnancy, with severe abdominal pain simulating appendicitis or renal colic. The symptoms of movable kidney are likely to become enhanced after labour from the general laxity of the surrounding tissues. A kidney may be so mobile that it may travel as far as the brim of the pelvis or even into the cavity thereof, and so cause obstruction to labour.

TUBERCLE OF THE KIDNEY.

Tubercular pyonephrosis is diagnosed by finding tubercle bacilli in the urine, and by the inferences drawn from cystoscopic examination of the bladder. The treatment should be that of the condition unassociated with pregnancy. Inasmuch as pregnancy leads to pyelitis and ureteral obstruction, the induction of abortion or

premature labour is entirely justified if the pregnancy appears to be exacerbating the disease.

CONGENITAL MISPLACEMENT OF THE KIDNEY.

In these cases the kidney is situated in the pelvis, the renal artery being derived from the common iliac. The kidney being fixed, it is much more likely to obstruct delivery than in the case of acquired mobility, and cases of such obstruction are reported.

TREATMENT.

If the tumour appears likely to cause or is causing obstruction, Cæsarean section is the proper course.

Lest the practitioner should be tempted to remove the kidney, it may be remarked that when a kidney occupies this position it is not unlikely that it may be solitary.

PYELONEPHRITIS.

CAUSE.

The cause of idiopathic pyelonephritis has been the subject of much discussion. The disease, though occurring irrespective of gestation and in both sexes, is commoner in pregnant women, and of these quite a marked percentage are primigravidæ. There must, therefore, be some predisposing cause in pregnancy.

The disease is very rare before the third month, and usually begins after the fifth. It is a recognised fact that the ureters of pregnant women are dilated, especially on the right side.

It would appear that this is due to the uterus pressing them against the brim of the pelvis, and, as the normal obliquity of the uterus is to the right, the right ureter is the one chiefly affected. The uterus being a pelvic organ until the third month, there is no pressure against the brim till after this period, but from thence it gradually increases until term.

The compression of the ureter dams back the urine in the pelvis of the kidney and dilates it to some extent. The hydronephrotic condition is subsequently followed by infection of the kidney with B. coli commune.

The routes by which the kidney is infected are two, ascending and descending. Authorities are not agreed which is the more common of the two, but the greatest weight of opinion is in favour of the descending route.

Descending or Hæmatogenous Route.—On this theory the bacillus reaches the kidney through the blood stream.

Experimental and clinical evidence proves that substances such as fat and bacilli can be excreted by the kidney and be detected in the urine.

It has been maintained, however, that the resistance of the kidney must be lowered to allow the organisms to pass. This might be due to the toxin in the blood produced by the bacillus, or to pressure on the ureters during pregnancy. The point then arises, how does the bacillus get into the blood stream? The suggestion is that it does so from the colon, as a result of chronic constipation and gastro-enteritis, or colitis.

Ascending Route.—By this theory the bacillus has to traverse the urethra, bladder, and ureter.

Those authorities who deny this route maintain that there are special natural barriers which would prevent such a method of infection, to wit, the compressor urethræ in the male, the vesical sphincter in the female, the oblique direction of the ureter as it traverses the bladder, and the opposing stream of urine. It would be necessary, therefore, for infection to take this route that these natural barriers should be removed, either by some injury to the ureteral orifice or by inflammation spreading up from the bladder along the mucous membrane of the ureter.

It is known that such complications may be present, but their occurrence is so rare when compared with the number of cases of pyelonephritis that they cannot be looked upon as a cause.

The advocates of the ascending theory maintain that there is always a preliminary stage of cystitis.

As a matter of observation, it has been found that only in 6·25 per cent. are there symptoms of cystitis present. In a large proportion of these the symptoms of cystitis are merely reflex; a cystoscopic examination of the bladder fails to discover any cystitis.

The cases in which cystitis is present can be accounted for on the supposition that the bacilli have previously passed through the kidney.

MORBID ANATOMY.

In the very severe cases multiple abscesses are found in the kidney, or if the kidney has been previously hydronephrotic, then a pyonephrosis will result.

In the milder forms there is no suppuration.

CLINICAL SYMPTOMS AND SIGNS.

The attack commences suddenly with a rigor and a rise of temperature from 101° F. to 105° F. The patient complains of

feeling very ill and depressed and of a severe headache, and the pulse rate is raised.

Clinically the cases can be grouped under one of the following types:

1. Where the symptoms and signs point definitely to one or other kidney.

2. Where the illness is more general and there are no localising signs.

3. Where the symptoms and signs point to some disease in the abdominal cavity.

Renal Type.—The patient complains of severe pain in the back, more often on the right side, but both sides may be affected, or the one some time after the other.

On palpation over the painful area, the muscles are found to be rigid and the part tender, and in many cases the kidney can be felt to be enlarged. This enlargement is partly due to the obstruction of the ureter, and in some cases it intermittently decreases with a corresponding increase of pus in the urine. The patient may complain of an increased frequency and pain in micturition suggestive of cystitis.

General Type.—In these cases the severity of the onset is much more marked.

The headache is severe and continuous, the rigors are repeated, the temperature, which may reach a very high level, even up to 107° F., is irregular, and suggests the possibility of suppuration somewhere.

These are the cases which have been confounded with influenza, enteric fever, pneumonia, ulcerative endocarditis, and other acute constitutional diseases.

There is often a marked absence of any indication that the disease is in the kidney. The rigors may be exchanged for convulsions and delirium, whilst squinting and retraction of the head has often been noticed, suggesting an attack of meningitis.

This type is more common in infants and children than in pregnant women.

Abdominal Type.—In this class of case the patient complains of acute abdominal pain; there is constipation, nausea, perhaps vomiting, and abdominal distension and rigidity, especially marked over the loin and appendix region.

Such cases may be diagnosed as appendicitis, cholecystitis, or intestinal obstruction.

DIAGNOSIS.

Pyelonephritis is a disease that is likely to be overlooked unless care is observed, since in many cases the symptoms appear to be

wholly constitutional, any local symptoms being kept in the background by the severity of the general ones.

The disease is diagnosed and diagnosed only by the condition of the urine, which must be examined most carefully by the microscope, if necessary after centrifugalisation. This is very necessary, because the urine is acid, and therefore, if only a slight amount of pus is present, it may appear practically clear after sedimentation and the observer may be put off his guard. The condition of the urine depends on the severity of the disease. In a mild case it is abundant, pale in colour, somewhat turbid when passed, and may show that peculiar appearance associated with bacilluria, an iridescent sheen, especially when viewed by artificial light. The odour sometimes resembles that of stale fish.

If the case is more severe, the urine will probably be scanty in amount, there will be pus in varying quantities which can easily be detected on inspection. Hyaline, granular or epithelial casts are occasionally present, and blood may be detected in addition.

Albumen is present in quantity proportionate to the amount of the pus.

The diagnosis has to be made from cystitis, as in both diseases there is pus in the urine; but in cystitis there is great pain in the bladder, tenderness over this organ, and very frequent and painful micturition, whereas in pyelonephritis, though it is true that the patients complain sometimes of pain in the bladder, there is an absence of tenderness in that situation, nor is the frequency of micturition which at times occurs associated with distress. In cystitis the urine is alkaline as a rule, in pyelonephritis it is acid. Lastly, a cystoscopic examination would disclose the presence or absence of cystitis.

It has already been remarked that pyelonephritis has been mistaken for enteric fever, appendicitis, intestinal obstruction, influenza, pneumonia, and ulcerative endocarditis. The onset might also be mistaken for a septic miscarriage, the pain simulating uterine contractions and the temperature suggesting sepsis. In all these diseases the alteration in the urine typical of pyelonephritis would be absent.

PROGNOSIS.

The prognosis as regards life is good, but as regards absolute cure it is less favourable. It has been calculated that at least 50 per cent. of the cases have a relapse, and in some the relapses have continued over almost an indefinite period.

The relapse may be so sudden in its onset that the observer may

look upon it as a fresh infection; but in the cases that have been watched, bacilluria has been present all the while.

In the mild cases the pain disappears in a few days, the temperature falls, and the patients recover. In the more severe cases there may be repeated rigors, accompanied by marked rises of temperature followed by intermissions to the normal, and marked wasting and anæmia. The disease goes on for three to four weeks or even more, the patient then recovering, but being subject to relapses. Intermediate cases are those where the temperature falls to normal, the pain disappears, but the urine still contains pus and bacilli.

Attacks vary in their severity. In general one may say that those cases where the symptoms and signs point definitely to the kidney as the commencement of the attack are the mildest; the abdominal type comes next, and the general type, where local symptoms are absent, is the worst; in fact, cases have been reported in this class where the condition has been so severe that the patient has died in a few days.

TREATMENT.

The treatment of pyelonephritis in pregnancy will depend upon whether the case is of a mild or subacute nature or whether it is acute.

Mild and Subacute Cases.—Drugs.—In the vast majority of cases the disease is due to an infection by the bacillus coli, and constipation is present. For this reason the bowels should be relieved by a strong purgative, after which minute doses of calomel should be administered every day.

Since the bacillus flourishes in an acid urine, this should be rendered alkaline or neutral by large doses of bicarbonate of potash or citrate of sodium or potassium, the amount varying with each patient.

To inhibit the bacillus in the urine such antiseptics as urotropin salol or helmitol should be given in 10 to 20 gr. doses three times daily.

In mild cases the above treatment may be successful, the temperature falling and the patient's condition showing a marked improvement.

If these measures are unsuccessful, the patient may be treated with an anti-toxin or vaccine.

Anti-toxin.—Dudgeon has reported successful results from the hypodermic injection of 25 c.c. of anti-colon bacillus serum for three consecutive days, together with the oral administration of calcium lactate (20 gr.) three times a day as a prophylactic against the joint

pains and rashes which at times follow the injection of anti-toxic serum. In cases of a chronic nature this treatment is of no avail.

Vaccine.—The treatment by vaccines appears to have very little effect in acute cases. We have treated cases of a chronic nature both during pregnancy and in the puerperium with apparent benefit. Thomson Walker recommends the following dosage: A first injection of 3 millions of bacillus coli, the organism having been obtained from the patient's urine by catheterisation, to be followed in five days by one of 10 millions, increasing the dose weekly to 15, 20, 25, 30 millions up to 100 millions, then 150 millions for six doses, and 200 millions for another six or twelve doses.

If the injection is followed by a rise of temperature and headache, the amount of the succeeding dose must be reduced and a longer interval allowed.

This treatment may have to be continued for months.

Ureteral Catheterisation.—Catheterisation of the ureter is sometimes very successful, especially in those cases of the renal type, where there is marked tenderness and swelling of the kidney. In these cases the ureter is likely to be acutely inflamed, resulting in a diminution of its calibre, so that at times it becomes practically occluded, more especially in the neighbourhood of the cervix uteri and pelvic brim. When the point of the ureteral catheter has reached the pelvis of the kidney any pus is evacuated by a small aspirating syringe. If the pus is too thick to flow, the pelvis of the kidney may be flooded with a sterile saline solution, and aspiration will be successful.

The catheter is then left *in situ* for two hours, with the result in many cases that the pain is relieved, the temperature reduced, and the recovery hastened on account of the better drainage obtained. A full account of this method of treatment is given by Bryden Glendining in the "Archives of the Middlesex Hospital," August, 1911, and he has successfully treated patients for us.

Terminating Pregnancy.—In the chronic and subacute cases it is not necessary as a rule to terminate the pregnancy. In cases, however, in which the measures described have failed and in which the patient's health is steadily deteriorating, it should be carried out. Greater readiness to resort to this step may be shown where the patient is some months from term, for in such there is considerable likelihood of spontaneous miscarriage or premature labour.

Acute Cases.—Terminating Pregnancy.—In acute cases the

question of terminating the pregnancy becomes a very pressing one. The remedies already indicated may be tried, but not much time must be lost in so doing. If the disease is bilateral the pregnancy must be forthwith terminated, if unilateral a trial may be given to anti-toxin treatment and to ureteral catheterisation, and with further experience it may be that the latter will be found to obviate the necessity of terminating pregnancy in many instances.

Termination of the pregnancy in most cases is followed by rapid improvement.

Nephrotomy and Nephrectomy.—If the kidney presents marked signs of disease and in spite of emptying the uterus there is no improvement within a week, nephrotomy or a nephrectomy must be performed. Thomson Walker points out that the results of nephrotomy have not been very encouraging, the immediate mortality being a high one, and the after-results are often unsatisfactory, nephrectomy having to be performed at a later date.[1] Nephrectomy is therefore the best operation, always provided the opposite kidney is sound.

PREGNANCY AFTER NEPHRECTOMY.

If the remaining kidney is known to be healthy, pregnancy is not absolutely contra-indicated except when the kidney has been removed for tubercular disease, in which case the supervention of gestation has been stated to be liable to bring about a recurrence of the disease. As pyelitis of pregnancy is usually unilateral, the fact that the patient has only one kidney increases very greatly her risk should she get an attack of pyelitis, especially if the remaining kidney is the right one.

RETENTION OF URINE.

Retention of urine may occur during pregnancy, labour, or the puerperium.

CAUSE.

Pregnancy.

The commonest cause of retention of urine during pregnancy is incarceration of the retroverted gravid uterus, see p. 168.

Retention may be caused in a similar way by a fibroid or ovarian tumour becoming impacted in the pelvis behind the uterus. Other conditions in which the pregnancy plays no part may be the cause, such as a urethral caruncle, urethritis, or some operation more particularly involving the abdomen, perineum, or anus.

[1] *Practitioner*, May, 1911.

Labour.

During labour the vertex may press upon the neck of the bladder, and this is more likely to occur if there is insufficient room, either because the pelvis is smaller, particularly in the case of a general contraction, or because the child's head is larger than usual.

Puerperium.

Retention of urine soon after labour is very common, and is most often due to the dorsal decubitus. It is also due to the bruising of the soft parts in the neighbourhood of the urethra. Additional causes are relaxation of the abdominal muscles, the suddenly altered relations of the bladder and urethra to surrounding parts, or the fact that the perineum has been sutured (reflex retention).

SYMPTOMS AND SIGNS.

The patient will complain of the usual discomfort associated with retention; but when there is "*incontinence of retention*," her only complaint may be that she passes urine too frequently, and the practitioner must be most careful with a complaint of this character to examine the abdomen for a distended bladder. Such a bladder will present itself in the middle line above the pubes, will be soft, elastic and semi-fluctuating on palpation and dull on percussion. Pressure upon the swelling will also originate a desire to micturate.

In some cases during labour the bladder, instead of rising up into the abdomen, is driven down before the head, forming a fluctuating swelling in the vagina.

RESULTS.

If the retention is not relieved, cystitis will supervene, see p. 72.

During labour, retention of urine with the bladder distended into the abdomen may cause the uterine pains to become less effective, whilst if it is distended below the head it may partly obstruct labour. A full bladder during this period also renders injury to the viscus likely, especially in the event of operative delivery. During the puerperium the over-distended bladder may interfere with the proper discharge of the lochia, since the uterus is lifted upwards, and, as a rule, somewhat to the right; its involution is interfered with, and even secondary post-partum hæmorrhage may result.

TREATMENT.

Pregnancy.

The bladder should be catheterised if the retention is due to pressure. The further treatment under these circumstances is dealt with elsewhere, p. 173.

Otherwise the remedies mentioned in connection with retention during the puerperium may be tried first.

Labour.

The bladder should be catheterised. There may be some difficulty, however, in passing the catheter, since the urethral orifice may be swollen and displaced somewhat forward, whilst the urethral canal will be stretched, and in addition the presenting parts may be pressing the urethra against the pubes.

It will be found best, therefore, to use a gum-elastic catheter, which from its length will be able to reach well into the bladder, and from its rigidity may be able to overcome any resistance due to the pressure of the head. Whilst the catheter is being passed, the head may be pushed away with a finger in the vagina.

Puerperium.

Passing the catheter for retention in the puerperium is, as a rule, to be avoided if possible for three reasons: first, because retention is rarely due to pressure; secondly, because of the danger of infecting the bladder, which is more likely than usual owing to the lochial discharge; and thirdly, because some women having once been catheterised seem incapable of micturating naturally for some days or weeks afterwards.

The usual type of retention occurring during the puerperium should therefore be treated first of all by change in position, the woman being allowed to sit or kneel and micturate in this position. The superstition that it is necessary to keep a patient strictly on her back for several days after labour should be combated. There is no reason why after a normal confinement she should not at once be permitted to micturate in the posture natural for that act.

Other methods on occasion successfully employed by the nurse are the application of warm fomentations to the abdomen and vulva, allowing warm water to trickle over the vulva, letting a tap run or pouring water from one jug to another, placing the patient over a bidet or bed-pan in which there is some hot water, and tightening the abdominal bandage. If the retention is associated with local

pain, a dose of opium may help matters. Pituitary extract can be tried. If in spite of these different methods the bladder cannot be emptied, the catheter must be resorted to.

The catheter should be well boiled, and then kept in the water it was boiled in, or transferred to perchloride of mercury solution, 1 in 1,000, till wanted. A glass catheter is the best.

Before passing it, the vulva should be carefully swabbed until every trace of lochial discharge has been removed, very special attention being paid to the cleansing of the vestibule in which area lies the urethral orifice.

After the parts have been thus cleansed a swab of wool wrung out in 1 in 1,000 perchloride of mercury should be placed over the urethral orifice and left in position till the catheter is passed. A receiver for the urine should be placed between the patient's legs. For the first day or two the catheter should be passed every eight hours, but afterwards every twelve hours is sufficiently often. The expulsive power is usually regained in a few days.

Difficulties in Catheterisation.—With a swollen condition of the vulva it may be very difficult to identify the urethral orifice, owing to the presence of one or more pits in the mucous membrane of its immediate neighbourhood, so that unless care is taken the catheter may be passed into the vagina. We need hardly say that in such an event the cleansing and sterilising processes should be again carried out.

The danger of passing the catheter into the vagina may be obviated by placing a wool swab in the vaginal orifice, but as a matter of experience such a precaution is hardly necessary. We have already pointed out the difficulty that may arise in labour owing to the pressure of the head and how to deal with it.

In retention due to incarceration of the retroverted gravid uterus, the practitioner must remember that the urethra is much stretched and displaced upwards behind the symphysis pubis.

Occasionally it happens that the urethra is injured during instrumental delivery, especially in neglected cases when the vulva has become much swollen and the vitality of its tissues much diminished. We have knowledge where in such a case the vestibule was severely lacerated and part of the urethra torn away. Retention ensued, and the opening of the ruptured urethra could not be identified. Suprapubic puncture of the bladder was decided upon, but preparatory to doing this, the labia were separated and the patient told to strain, when a little urine escaping disclosed the position of the urethral opening.

The subject of cystitis is dealt with on p. 72.

DIABETES MELLITUS.

During pregnancy the liver secretes an abnormal amount of glucose into the blood as the result of the hyperactivity of its glycogenic function. The amount of glucose secreted may be no more than can be changed into lactose, which, not being required, is reabsorbed and excreted by the urine. If there is an excess of glucose, the quantity over and above what is required for conversion into lactose is excreted as glucose, so that, especially after the sixth month, it is not uncommon to find in a certain number of pregnant women, more especially in multigravidæ who have already nursed their children, a temporary or "physiological" glycosuria, not giving rise to any symptoms, but which can be detected on the routine examination of the urine. This is but a passing event, and the sugar disappears on the termination of labour, to appear again perhaps when the woman next becomes pregnant. Milk-sugar can be found in the urine of all pregnant women just before labour and during the nursing period, but its presence is of no importance, being natural and due to absorption from the milk. It is therefore necessary when examining the urine to ascertain the nature of the particular sugar it contains. In the cases of "resorption diabetes" it is lactose and not glucose that is present.

Lactose can be recognised by the fact that the urine is still capable of reducing Fehling's solution after the fermentation test has been applied, and further the typical crystals of lactozone may be obtained by the phenyl-hydrazine test.

Glycosuria associated with the well-recognised symptoms of diabetes mellitus is a rare complication of pregnancy. It has been stated to occur in pregnant women as a result of the absorption of glycogen from the placenta, certain cells of which contain large quantities of this substance. The amount of glucose due to this cause is, however, small.

It is a fact that acetone and diacetic acid, both of which are characteristic of the urine of diabetes, are also met with in certain cases of pernicious vomiting of pregnancy, namely, those of the toxic type, and also in the closely allied disorder, acute yellow atrophy of the liver. Sugar, however, is not present in either of these cases.

In true diabetes, glucose, diacetic acid, and acetone are all present, the first in considerable quantities always (over 2 per cent.), and the two latter often so.

To test for acetone, dissolve some nitro-prusside of potash in a sample of the urine to be tested. Pour gently on to the top of the mixed specimen some liq. ammoniae fort, when a beautiful purple colour appears at the ring of junction of the two fluids.

To test for diacetic acid drop in a solution of perchloride of iron diluted to a pale sherry colour as long as a precipitate of phosphate of iron occurs. Now filter and add another drop or two when a claret colour appears which disappears on boiling.

The patient may be afflicted before she becomes pregnant, or glycosuria may appear first during pregnancy or the puerperium.

PROGNOSIS.

The effect of the superimposition of pregnancy varies according to the type of the diabetes.

In the acute and rapidly progressive cases in which the typical symptoms of diabetes are present, the continuation of the pregnancy augurs ill for both the mother and child, and the prognosis may be regarded as a grave one. In the milder "alimentary" type, on the other hand, the diabetes may not interfere with the pregnancy nor the latter increase the severity of the disease, so that the patient goes to term without any untoward symptoms.

As a rule, however, diabetes becomes worse as pregnancy proceeds, and in at least 50 per cent. of the cases premature labour takes place. Close upon 25 per cent. of the women die if pregnancy has complicated the diabetes, and about 33 per cent. die if the disease has supervened during pregnancy. Diabetic coma ensues most commonly just after delivery. The child in a large number of cases is dead, whilst hydramnios is a common complication, and sugar can be detected in the liquor amnii.

DIAGNOSIS.

The question of resorption diabetes and a physiological glycosuria has already been dealt with. Diabetic coma may be mistaken for the coma of eclampsia or cerebral hæmorrhage.

TREATMENT.

No one has had a sufficient number of cases to make it certain which is the best method of treatment. As the child dies in at least 50 per cent. of these cases, and as in most cases the diabetes increases in severity during pregnancy, induction of labour would seem the best treatment. Pregnancy should certainly be terminated if the percentage of sugar and the amount of diacetic acid markedly increase, or if the patient wastes rapidly and becomes very weak.

The practitioner must, however, remember that coma is likely to supervene on the induction, and that, therefore, he should be careful to warn the relatives of this beforehand.

Some authorities argue that it is better to let the patient go to term, only inducing labour if she becomes very bad. If this treatment is followed, the patient should at once be placed on a strict and suitable diet and under the influence of full doses of sodium bicarbonate and codia. If these effect a marked diminution in the sugar excretion, there will be no necessity to interfere with the pregnancy. Where it is otherwise, the termination of the gestation is indicated.

In regard to the management of labour or abortion, natural or otherwise, the administration of a general anæsthetic, especially chloroform, is to be avoided if possible, for both this drug, and to a lesser degree ether, cause acetone and diacetic acid to appear in the urine. The use of hedonal by intravenous injection would appear to be indicated if anæsthesia is a necessity. Where by reason of the large amount of glucose in the urine the possibility of the supervention of coma appears likely, and especially if chloroform has had to be given, it is a wise precaution at the time of delivery to administer 2 or 3 pints of solution of carbonate of soda (a teaspoonful to a pint) by intravenous injection, and to supplement it by 6-oz. rectal injections of the same every two or three hours until such time as the patient can take full doses of the drug by the mouth.

DIABETES INSIPIDUS.

This condition may arise during pregnancy or be antecedent to it. The patient complains of great thirst, and on account of the large amount of urine secreted the bladder becomes dilated and the pressure of the pregnant uterus causes distressing frequency of micturition both night and day.

There is no hydramnios, and the condition does not seem to interfere with pregnancy in any way. The condition has been noted to arise after a severe mental shock.

An examination of the urine discloses a low specific gravity, otherwise it is normal, albumen and blood being absent.

ECTOPIA VESICÆ.

Ectopia of the bladder is associated with the deformity known as the "split" pelvis.

Recorded cases show that the abnormality neither renders pregnancy unbearable nor natural labour impossible. Pregnancy occurring in such an individual should not therefore be interfered with unless untoward symptoms are present, see p. 408.

CYSTITIS.

CAUSE.

Inflammation of the bladder may be primary in the viscus itself or may be secondary to some inflammatory condition in its immediate vicinity.

Primary infection may be due to the pressure of a retroverted gravid uterus, to the invasion of bacillus coli commune in a manner similar to that which obtains in pyelitis, see p. 60, to injury during the labour, or to careless catheterisation afterwards. Injury is most liable to occur in the course of labour obstructed by narrowing of the pelvis, the pressure of the head bruising and devitalising the bladder wall. Such labours are apt to be followed by sloughing of part of the trigone and the formation of a vesico-vaginal fistula.

In the worst cases of cystitis the organisms most commonly present are streptococci or staphylococci, and the urine is markedly alkaline, ammoniacal and "ropy."

Secondary cystitis is usually seen as a complication of pelvic cellulitis, see p. 513. In such cases the infecting organism is often the colon bacillus. In such an event the urine is acid and the symptoms less severe.

In either case marked pain and frequency of micturition are present, together with the constitutional symptoms of fever and rapid pulse in proportion to the severity of the lesion.

In the gravest cases the vesical mucosa may slough or the infection ascend to the kidneys (pyelonephritis).

DIAGNOSIS.

Pyuria from pyelitis is distinguished by the pain and tenderness over the affected kidney or kidneys and the relative absence of bladder symptoms.

Alkaline urine points strongly to cystitis, as does marked tenderness on palpation of the bladder or the passage of the catheter.

TREATMENT.

In the acute stage the viscus should be washed out twice a day with boracic acid solution, ʒj ad Oj. The fluid should be run in by a funnel attached to the catheter by a rubber tube.

The patient should be given large quantities of "barley-water," and a urinary antiseptic such as salol, 10 gr., or urotropin, 10 gr., should be administered by the mouth three times a day.

The treatment of a vesico-vaginal fistula is dealt with on p. 455.

VESICAL CALCULUS.

Stone in the bladder will not complicate pregnancy unless it causes cystitis or pyelonephritis. As a complication of labour it is very rare; but a few cases have been recorded in which a vesical calculus obstructed labour, either by becoming impacted on the pelvis or by causing a cystocele.

FIG. 11.—Obstruction to Birth of Child by a Vesical Calculus.

We have seen one example of this complication in which the patient suffered for several weeks prior to her confinement with symptoms pointing to pyelonephritis, but which were attributed to a "tumour" which it was proposed to deal with after the birth of the child.

When labour supervened, the child was delivered with forceps, but only with much difficulty, owing to the "tumour."

The patient, two weeks after her confinement, came under the care of one of us, and the "tumour" was found to be a vesical

calculus. It was removed, but the patient died a few hours later. The stone weighed 565 grains (Fig. 11).

SUPPRESSION OF URINE AFTER LABOUR.

CAUSE.

The suppression of urine following labour is a very rare event.

In most of the cases that have been reported the cause has not been identified, as unfortunately a *post-mortem* examination was not made, but in eleven cases reported by Rolleston symmetrical necrosis of the cortex of the kidneys was found.

In some instances the urine before labour was found to contain albumen and a deficiency of urea; or there had been albuminuria in a previous pregnancy, whilst most of the children were still-born and generally premature, and all the multiparæ had given birth to a dead child in a previous labour.

There remain a few cases in which no symptoms pointing to kidney disease were present during pregnancy and the urine was free of albumen, neither was there a previous history which would indicate such a disease. These cases have been ascribed to the shock of a rapid delivery (in all the cases labour was much shorter than usual and in one precipitate); just as suppression of urine sometimes follows the shock of a surgical operation. This complication followed the removal of an impacted dermoid of the ovary by Bland-Sutton in a patient nine months pregnant, the suppression lasting for several days. Labour was induced by one of us, a living child delivered, the renal function returned, and the mother made a complete recovery.

That there must be some other cause beside the renal insufficiency is proved by the very rare occurrence of total suppression after birth of the child, even in severe cases of eclampsia. In the reported cases of total suppression there were no convulsions. Most of the observers who have reported instances of this complication state that the patient was neurotic.

SYMPTOMS AND SIGNS.

The clinical features of suppression of urine after labour correspond to those observed when the ureters are obstructed, the patient after a few days of apparent good health becoming drowsy, which state passes into one of coma and occasionally convulsions. In addition muscular twitchings and constant vomiting are present and the pupils are contracted.

TREATMENT.

Careful inquiry should be made in all cases as to the quantity of urine passed after labour, otherwise the complication under discussion may escape detection for a short time. A reference to the reported cases of suppression of urine shows that they not infrequently escaped diagnosis for the first few days.

Directly suppression is diagnosed active measures should be taken to encourage the kidneys to secrete, and of these the most useful is the intravenous or subcutaneous injection of saline solution. Additional remedies consist in the administration of purges, the application of hot fomentations to the loins, cupping, and the induction of sweating by means of hot-air baths. If these measures have no effect the kidneys should be exposed through loin incisions and either decapsulated or incised and drained. The complication is unfortunately a very fatal one.

CHAPTER IV.

Disorders of the Peritoneum, Gall Bladder, and Spleen.

PERITONITIS.

Peritonitis may complicate pregnancy or puerpery. The latter event is dealt with in Chapter XXV. In pregnancy, peritonitis may be either local in the pelvis or in some other situation, or it may be generalised.

PELVIC PERITONITIS.

CAUSE.

Appendicitis.—Inflammation of a vermiform appendix lying in the pelvis is the commonest cause of pelvic peritonitis during pregnancy, and is fully dealt with on pp. 38 and 39.

Pyosalpinx.—This complication of pregnancy is a very unusual one, for a woman suffering from bilateral salpingitis cannot become pregnant.

It is, however, possible for the pregnancy and the salpingitis to be incurred simultaneously at the same coitus, and it therefore occasionally happens that intra-uterine pregnancy coexists with a single or even double salpingitis. Further, cases of tubal gestation on one side and pyosalpinx on the other are on record.

Moreover, since the uterine cavity is not obliterated until the third month, it is possible for infection, incurred subsequently to the pregnancy, to spread to the tubes.

Ovarian Disease.—Abscess of the ovary is most commonly secondary to infection of the tube, and may coexist with pregnancy under the same circumstances.

There is a variety of ovarian abscess, however, which arises *de novo* from infection of the recently dehisced follicle independently of tubal infection.

This variety, which may be styled the "solitary" ovarian abscess, is probably due to the invasion of the corpus hæmorrhagicum by organisms derived from the bowel.

Torsion, necrosis, or rupture of tumours of the ovary may also be the cause of pelvic peritonitis.

Ulcers of the Pelvic Colon or Rectum.—Ulcers in these situations may perforate, setting up pelvic peritonitis.

Myoma of the Uterus.—The source of the peritonitis may be an infected fibroid, or one that has undergone twisting of its pedicle.

Ruptured Tubal Gestation.—Presuming the patient to survive the immediate loss of blood, a ruptured extra-uterine pregnancy, if not dealt with by immediate operation, is soon followed by inflammation of the pelvic peritoneum, the effused blood acting as an irritant and provoking in a short time the presence of organisms there.

DIAGNOSIS.

In pelvic inflammation, no matter from what source it arises, pain and tenderness are felt at the back and sides of the uterus, and sooner or later a swelling appears in this situation. Tenderness and rigidity of the lower abdomen are present in varying degree, and the usual constitutional signs of peritonitis.

The distinction of the nature of the causative lesion is often very difficult. If a definite tumour is felt in the pelvis at the onset of the symptoms, it is probable that a neoplasm or effusion of blood has pre-existed the inflammation, for a purely inflammatory tumour takes some days to form.

If pregnancy is at all advanced, the enlarged uterus obscures the abdominal signs. A violent and apparently causeless peritonitis beginning in the pelvic region of a pregnant woman should always suggest rupture of a solitary ovarian abscess.

These cases are remarkably insidious, and no symptoms may be apparent until the abscess bursts into the peritoneal cavity. In a case we had under our care at the Middlesex Hospital, the abscess must have burst shortly before labour, but gave rise to no symptoms till some hours after, when the patient died with signs strongly suggesting acute gastric dilatation. At the *post-mortem* examination peritonitis due to the rupture of a solitary ovarian abscess was found.

The diagnosis of extra-uterine gestation is discussed in Chapter XXVIII.

Fortunately the exact recognition of the cause of the inflammatory outbreak is not material, the treatment being initially the same in all cases.

TREATMENT.

All cases of pelvic peritonitis occurring during pregnancy should be treated by abdominal section.

Pelvic peritonitis is so rare and yet so likely to be due to some very serious lesion that the safest course is to operate.

The exact procedure to be followed after the abdomen is opened and the cause of the peritonitis ascertained will depend upon the finding. If the pregnant uterus be in the way of the complete removal of the inflammatory focus or of proper drainage afterwards, it must be sacrificed, the child being first removed by Cæsarean section if it be viable. The vagina should then be utilised to drain the pelvis.

The prognosis of such cases is graver than would be the case if the patient was not pregnant.

OTHER SITES OF PERITONITIS.

Local.—Local peritonitis not beginning in the pelvis is most commonly due to the appendix. It may also arise from inflammation of the gall bladder, from a perforated gastric or duodenal ulcer, or from other less common causes.

General.—General peritonitis may be secondary to local peritonitis, beginning in the pelvis or elsewhere. Primary general peritonitis may be due to infection by the pneumococcus or the tubercle bacillus.

DIAGNOSIS.

To discover the cause may be impossible until the abdomen is opened, or symptoms and signs may be present of such a nature that the cause can be identified.

TREATMENT.

The treatment in general is the same as in these conditions apart from pregnancy. The treatment of appendicitis and cholecystitis is dealt with on pp. 40 and 83.

PREGNANCY COMPLICATED WITH PELVIC ADHESIONS.

Although it is very rare for a woman to become pregnant if her uterus is the subject of extensive pelvic adhesions, yet the event sometimes happens, and in this case abortion most usually results. In such cases the enlargement of the uterus may produce severe pressure symptoms, especially if it is fixed in a position of retroversion, see p. 166.

As pregnancy proceeds injurious traction on the intestine may occur, leading to intestinal obstruction.

TREATMENT.

The treatment of an adherent retroverted gravid uterus is dealt with on p. 177.

For the rest, the patient may be treated with douches, ichthyol and glycerine tampons, and the internal administration of iodides and fibrolysin, while if symptoms of obstruction or pressure arise, the uterus must be emptied or otherwise dealt with.

JAUNDICE.

Jaundice is a rare complication both of pregnancy and the puerperium. When so occurring it may be either obstructive, toxæmic, or septicæmic in origin.

Obstructive Jaundice.

Catarrh of the duodenum, the commonest form of jaundice to be met with during pregnancy, is not in most cases of any serious consequence; it has no effect on the course of pregnancy or upon the child. It is important to remember that acute yellow atrophy is heralded for some days by an apparently simple jaundice.

Graver causes of obstructive jaundice are stricture of the duct, tumours of the duct; tumours of the liver, stomach, pancreas or kidney; an abdominal aneurysm; enlarged glands, chronic pancreatitis, and gall stones impacted in the duct.

Toxæmic or Septicæmic Jaundice.

This variety of jaundice may be due to poisoning by phosphorus or arsenic, to such diseases as scarlet fever, enteric fever, typhus, malaria, yellow fever, relapsing fever, and septicæmia, and to such auto-intoxications as acute yellow atrophy, pregnancy nephritis, and pernicious vomiting.

Of these it is only necessary here to consider the auto-toxic forms and that due to septicæmia.

Acute Yellow Atrophy.—Under certain unknown circumstances pregnancy is accompanied by the production of toxic substances which, circulating in the maternal blood, act destructively on the hepatic cells. The breakdown in the liver is in most cases associated with the appearance of jaundice.

Our knowledge of these cases is still obscure, but undoubtedly there are several types of the disease. The most typical of them is that known as acute yellow atrophy of the liver. This condition, which is a rare disease, may also occur apart from pregnancy, so that presumably more than one variety of toxæmia can produce it. It bears a close relation to the toxæmic variety of pernicious vomiting, the latter disease being sometimes accompanied with jaundice. See p. 30.

Acute yellow atrophy sometimes appears in an epidemic form.

Jaundice and Pregnancy Nephritis.—As is well known, cases dying of eclampsia present more or less marked signs of hepatic degeneration on *post-mortem* examination, but it is comparatively rare to see eclamptic patients jaundiced.

More commonly the jaundice is associated with simple albuminuria, the patient not being pregnant more than five or six months, earlier, that is, than pregnancy nephritis is usually met with.

Jaundice associated with Puerperal Sepsis.—This again is a serious sign and does not, as a rule, appear unless the case is likely to be of a fatal nature. The subject of puerperal sepsis is dealt with in Chapter XXV.

SYMPTOMS AND SIGNS.

Acute yellow atrophy may occur quite early in pregnancy, but is commoner towards the end. The course of the disease is short. It commences insidiously with jaundice of an apparently simple character, and for this reason such cases should always be closely watched. After the lapse of some days, generally within a week or so, serious manifestions appear, such as persistent vomiting, subcutaneous hæmorrhages, rapid pulse, and headache.

Pain in the upper abdomen is complained of, and there may be an acute effusion of serous fluid into the peritoneal sac. The liver dulness rapidly diminishes and the apex beat of the heart may move to the third intercostal space, probably as the result of the rapid reduction in weight of the liver. The temperature varies, most commonly there is no fever. The vomit becomes hæmorrhagic, delirium, convulsions, and coma supervene, and the patient dies within the week.

An examination of the urine will disclose albumen, the percentage of urea is diminished, and the amount of nitrogen present as ammonia shows a considerable increase from the normal of about 5 per cent. Products of liver disintegration, such as leucin, tyrosin, acetone, and diacetic acid are also present in the urine.

DIAGNOSIS.

Jaundice associated with pregnancy has to be distinguished from jaundice due to pregnancy. The former may be of the benign kind or may be due to cholangitis, or to calculous, carcinomatous, or other obstruction.

The urine should be examined very carefully both microscopically and chemically so as to eliminate the toxæmic causes of jaundice.

Rarely jaundice and fever may be associated for weeks together without any further complication, and the patient has gone to term safely.

In none of these conditions does the urine contain products indicating katabolic changes in the liver; whilst the urine in cases of acute yellow atrophy, pregnancy nephritis, and pernicious vomiting has the definite characteristics described under those heads.

PROGNOSIS.

In acute yellow atrophy, abortion or premature labour is usual. The prognosis is very bad, nearly every reported case having died. Jaundice associated with pernicious vomiting or eclampsia is also a grave sign. Jaundice and albuminuria without other symptoms is less serious.

TREATMENT.

If the jaundice can reasonably be considered to be due to the pregnancy, the latter should at once be terminated. The methods of doing this will vary with the age of the gestation and in a degree with the gravity of the symptoms and signs. In general it may be said that no unnecessary time should be lost.

Steps having been taken to empty the uterus, the patient should be treated on anti-toxæmic lines.

An analogous type of jaundice due to rapid breakdown of the liver is sometimes seen in patients operated upon under chloroform anæsthesia for certain acute septic states. It has been found in these cases that improvement follows the administration of glucose, as advised by Beddard, see p. 581.

Cases of acute jaundice occurring during pregnancy should on analogy be similarly treated. The glucose may be administered by the mouth if the patient can take and retain it, but if not, it should be given either by rectal injection or by intravenous infusion. The rectal injection should contain four teaspoonfuls of glucose and one of bicarbonate of soda to the pint, and the intravenous infusion two teaspoonfuls of glucose and one of bicarbonate of soda to the pint.

GALL STONES.

Most cases of jaundice in pregnancy associated with fever and pain are due to gall stones. In about 30 per cent. of the cases the attack occurs in the first five months of pregnancy. Of the remainder, 10 per cent. occur in the puerperium and half of these in the first seven days.

DIAGNOSIS.

The usual symptoms and signs will be present, although occasionally there may be a certain amount of difficulty in diagnosis.

Cholecystitis has been mistaken for appendicitis and pyelitis, and if perforation and general peritonitis occur, then the other causes of the latter condition may have to be considered.

An attack of cholangitis or cholecystitis in the puerperium may lead to a mistaken diagnosis of "puerperal sepsis," the illness commencing with rigors, a rise of temperature, increased pulse rate, nausea or vomiting, and tympanites.

TREATMENT.

The coincidence of the symptoms and signs of gall stones and pregnancy does not alter the recognised treatment of the former except in the latter month or two of pregnancy, when owing to the diminished accessibility of the gall bladder by reason of the intestines being crowded into the upper abdomen, it is advisable to postpone any operation thereon until after term unless the condition is urgent.

The operation has no particular tendency to cause miscarriage or premature labour, but if the child is just approaching the period of viability, the operation should be postponed for a short time, if possible, in its interests.

The operative mortality in pregnancy is returned as 13 per cent., and in the puerperium as 10 per cent.

CANCER OF THE LIVER.

The coexistence of cancer of the liver and pregnancy is very unusual. If the liver is much enlarged, the addition of the pregnant uterus might give rise to pressure symptoms.

Inasmuch as the duration of life in cancer of the liver is at the most a few months, the evacuation of the uterus, if it appear indicated, is the less to be regretted, because the chances of the child surviving in any case are very poor.

ABSCESS OF THE LIVER.

The treatment of an hepatic abscess in a pregnant woman does not differ from that to be pursued in the absence of pregnancy.

SPLENIC LEUKÆMIA.

See p. 131.

MOVABLE SPLEEN.

Recorded cases show that a movable spleen is not likely to cause trouble during pregnancy, nor is there any case on record in

which it produced obstruction in labour, as far as we know, although it has been found in the pelvis during this period.

A movable spleen, however, may undergo axial rotation during pregnancy, an event which is followed by acute pain in the left side, fever, and tenderness; in most of these cases it appears that the symptoms have passed off and normal labour has resulted.

SLOUGHING AND PERISPLENIC ABSCESS.

This is a very rare complication of pregnancy. It is probably nearly always due to torsion of the pedicle of an unduly mobile spleen.

It is to be treated on ordinary surgical lines irrespective of the coexistent pregnancy.

WOUNDS.

The spleen has ruptured during pregnancy either spontaneously or as the result of kicks and other traumata, and the patients have recovered after splenectomy, without, in some cases, abortion resulting.

A remarkable case was one in which a single woman, age thirty-eight, shot herself during labour. The bullet passed through the thorax, tore the diaphragm, pierced the stomach and lacerated the spleen.

A dead child was delivered by craniotomy, the spleen removed, and the diaphragm and stomach sutured. The patient recovered.

The treatment of wounds of the spleen is operative, namely, exposure followed by suture or removal of the organ. The co-existence of pregnancy does not affect the treatment.

RUPTURE OF A SPLENIC ANEURYSM.

There are a few cases on record of rupture of an aneurysm of the splenic artery during pregnancy or labour. The patients died from intra-peritoneal hæmorrhage, see p. 285.

PREGNANCY AFTER SPLENIC RESECTION.

Pregnancy is unaffected by previous removal of the spleen.

CHAPTER V.

Disorders of the Skin.

ACNE.

Although acne is common enough in women who are not pregnant, yet in some it has a special relationship to that state, only appearing when the woman is pregnant. Again, in some cases a mild acne causing but little discomfort will "light up" and become very severe if pregnancy supervenes.

ALOPECIA AREATA.

The effect of pregnancy on alopecia areata is favourable, the increased blood supply stimulating the hair follicles, with the result that the bald patches rapidly become covered with a growth of hair. Instances have been reported in which women with almost universal alopecia have had their heads covered with a profuse crop of hair during pregnancy, only to lose it all at the termination of this period, the hair again appearing with each renewal of pregnancy.

CHLOASMA.

Chloasma is the name given to the brownish-yellow pigmented patches that are sometimes seen on the forehead, nose, and upper lip, and more rarely scattered all over the face in pregnant women. They are unsightly, but disappear after labour.

PIGMENTATION.

During pregnancy certain parts of the body always become pigmented; they are the areolæ of the breast, the axillæ, and a line running from the pubes to the umbilicus. This pigmentation is more marked in brunettes than in blondes. Occasionally the pigmentation becomes very marked, so that the skin in the situations mentioned is almost black, and dark rings appear round the eyes. As a rule, the pigmentation disappears after labour, but we have known it remain for over a year, and cause much disfigurement.

It is in these cases of abnormal pigmentation that the chloasma already noted appears.

HERPES GESTATIONIS.

This skin disease, which is thought to be due to a neuritis of toxæmic origin, is peculiar in its multiform character and herpetiform grouping. In the vast majority of cases it only affects pregnant women, or more rarely women in the first few days of the puerperium. Clinically it bears a close resemblance to dermatitis herpetiformis, and may be regarded as a variety of that disease. The disease may occur in the first or any subsequent pregnancy, and has not uncommonly recurred in the same patient during successive pregnancies. It has no effect on pregnancy.

SYMPTOMS.

The rash may cause a good deal of worry from the accompanying itching and burning; more rarely this is so marked that the patient becomes exhausted from lack of rest. In these cases also there may be fever, and occasionally death has been attributed to this disease. The itching may be present days, or even weeks, before the eruption appears.

SIGNS.

The rash, which appears first on the extremities, especially on the buttocks and at the back of the legs and arms, may in severe cases be universal. Erythematous patches, papules, vesicles, pustules or bullæ may be found, either fairly separated or gathered into small groups, thus giving rise to an herpetiform appearance. The lesions appear in no particular order: in some cases the erythematous patch comes first, to be followed by the papules and vesicles; in others the opposite obtains. The vesicles vary in size, the smaller ones tending to form in groups, as indicated above.

After the rash has disappeared, marked pigmentation may appear in its situation.

TREATMENT.

Arsenic, hypophosphites, and iron should be given. For the itching, a powder composed of bismuth and starch, or solutions of carbolic acid, menthol, or corrosive sublimate, or bran baths may be tried. Chloral hydrate or opium may be necessary if the patient is not sleeping well.

IMPETIGO HERPETIFORMIS.

This rare and formidable disease has some special relationship to pregnancy, inasmuch as in nearly all reported cases the patients

have been pregnant women. The number of deaths is very high, the mortality being at the rate of at least 75 per cent. The disease is rarely, if ever, seen in this country. It is closely allied to dermatitis herpetiformis and herpes gestationis, but differs from these diseases in being pustular from the start. The eruption, which consists of groups of pustules arranged on an inflamed base, appears first on the genito-crural region, anterior surface of the limbs, umbilical region, breasts and axillæ, and eventually may spread to the mucous membrane of the mouth, nose and throat, and to other parts of the body. The pustules run together, dry up and become crusted over in two or three days. New pustules then appear on the edge of this crust, forming a ring round it, and pass through similar stages, only to be succeeded by further groups, till at last large patches of skin are covered. The surface below the crust is moist and red, and healing takes place in the centre.

The skin burns and itches, fever is present in varying degree, and becomes temporarily worse as each crop of vesicles appears. There is great debility, and the patient dies from exhaustion after an illness of a few weeks or a few months.

There is no special predisposition to abortion or premature labour.

TREATMENT.

The local lesions should be treated by soothing applications and the patient's strength must be supported as far as possible, but no remedy has yet been discovered that is of any particular use except the continuous water-bath, which in the cases that have recovered was the principal treatment.

Seeing that the disease is so fatal in character and so intimately associated with pregnancy, the induction of abortion or premature labour would seem to be indicated.

MOLLUSCUM FIBROSUM.

Pregnancy appears to exert a certain definite influence on this disease, or in some instances to initiate it.

In such cases the disease appears about the fourth or fifth months, is limited to the clavicle, back, breasts, and scapula, the lesions are pedunculated, slightly pigmented, and increase in number up to forty or fifty. The condition is not associated with any pain, itching or discomfort of any sort, and the lesions disappear from a few weeks to a few months after labour.

Molluscum fibrosum already present when the patient becomes pregnant shows a tendency to get worse.

PUERPERAL RASHES.

It occasionally happens that during the few days following labour an erythematous rash will appear on the body, not causing any particular constitutional disturbance, and arising without obvious cause. There are other rashes of a similar nature which may appear during this time, namely, those due to an enema, to mercury, belladonna, carbolic acid, chloral hydrate, quinine or opium, to scarlet fever, or puerperal sepsis.

An enema rash is irritable, appears more particularly on the buttocks and abdomen, and follows the use of common household soap instead of soft soap in the enema. It appears a few hours after the administration, is transient and unaccompanied by fever or other disturbances.

Mercury applied to the skin in the form of a compress may cause an erythematous rash with the formation of vesicles, developing perhaps into pustules. Taken internally the drug may produce almost any kind of skin lesion. Other signs of mercurial poisoning would be present. The rash of belladonna and atropin resembles that of scarlet fever. It generally affects the face, neck, and trunk, and is accompanied by severe itching. The rash at times appears after belladonna has been applied locally to the breasts or given internally as a means of arresting the secretion of milk.

It sometimes happens that the administration of chloral hydrate in pre-eclamptic conditions or for uterine exhaustion will be followed by a diffuse or patchy erythematous rash, especially on the head and face, which quickly fades and is unaccompanied by constitutional symptoms.

Quinine may cause skin rashes of various types, and among them erythema; the mucous membrane of the throat may be affected and the condition may be mistaken for scarlet fever.

Opium at times causes an erythematous rash accompanied by heat and severe itching. It may resemble scarlet fever or measles.

The rash of scarlet fever is associated with marked general disturbance, a high temperature, a sore throat, and swelling of the lymphatic glands. There may be albumen in the urine. The skin peels in largish flakes. On the other hand, a puerperal erythema is not associated with a sore throat or glandular affection, the temperature may be normal or only a little raised, the rash lasts five to six days, and the skin desquamates in fine flakes.

Puerperal rashes of an erythematous nature, either patchy or diffuse, are not uncommon with puerperal septicæmia, but there are other signs present which will point to the nature of the disease.

Under the same circumstances a sudaminal rash may appear. In very bad cases the eruption may be hæmorrhagic.

PURPURA.

Purpura is an indication of some toxic process. It may complicate pregnancy, but is a rare occurrence. Very severe cases have been reported in which hæmorrhagic patches have appeared all over the trunk, limbs, and vulva, blood and albumen have been noted in the urine, and the patient has aborted and died in a few days. At the *post-mortem* examination no definite cause has been discovered.

URTICARIA.

Occasionally women who have never had urticaria are thus affected when they become pregnant. This irritating symptom may continue throughout pregnancy without any apparent cause in spite of any measures taken for its relief, and will only disappear after birth of the child.

ECZEMA.

If a patient with eczema becomes pregnant the disease is likely to be alleviated. In a woman who has had eczema, the disease does not tend to recur when she becomes pregnant.

PSORIASIS.

This skin affection either gets better or worse during pregnancy. It depends upon the particular woman who is affected ; but all women suffering from this disease become much worse during the puerperium, especially if they nurse their children. Psoriasis may become so severe that the child has to be weaned.

PRURITUS.

Pruritus may either be general, or local in the region of the vulva ; the latter is by far the commonest.

CAUSE.

Whilst general pruritus is a disease of the nerves due probably to toxæmia, the local variety need not necessarily be so, and therefore in this a careful examination must be made for some specific cause, such as pediculi pubis, acarus scabiei, oxyuris vermicularis, hæmorrhoids, irritating vaginal discharge or glycosuria.

In the absence of these, pruritus may be a preliminary stage of

herpes gestationis or urticaria, or it may be due to the congestion of pregnancy.

SYMPTOMS.

The itching varies in intensity from a degree which can be tolerated to one which causes abject misery, depreciates the general health, makes the sufferer shun all society, and predisposes to suicide from the constant irritation and loss of rest.

TREATMENT.

The practitioner must first of all satisfy himself that there is no local cause. He should carefully examine the urine, when, if glycosuria is found, it should be treated as indicated on p. 71. A vaginal discharge must be treated with douches. Pediculi can be treated with a solution of perchloride of mercury, scabies with sulphur ointment, oxyuris with rectal injections of quinine or salt solutions. If no cause can be found, the question of treatment is often a very difficult one. Great attention must be paid to the diet, so that nothing of a stimulating nature is taken in the way of alcohol, made-up dishes or condiments, and in some cases a milk diet alone is the best to prescribe. The bowels should be regularly evacuated, as constipation in itself may be a cause of congestion.

Internal remedies to be prescribed are the bromides, chloral and arsenic, and in very severe cases it may be necessary to give some preparation of opium. Antipyrin has been found useful in certain patients, also cannabis indica. The number of drugs that have been tried and recommended is only an indication of what an intractable condition pruritus is in some cases, and the reaction to various drugs varies so in different women that what will relieve one almost at once has not the slightest effect on another. It may be necessary to try a large number of remedies, and if the case is very severe and grave, induction of labour may have to be seriously considered.

The following drugs have been found successful in particular cases :

A solution of perchloride of mercury, 1 in 1,000, washed off with plain water ; tincture of iodine painted on ; a solution of glycerine and carbolic acid ; camphor water ; menthol ointment ; icthyol ointment ; aconite liniment ; creolin or lysol, 1 per cent. ; a lotion of lead and opium ; hydrocyanic acid and lead lotion ; chloroform, 1 dr., in almond oil, 1 oz. ; and " Zymocide," 1 in 4, in water.

Intramuscular injections of saline solution, 150 c.c. to 200 c.c., may be tried.

CHAPTER VI.

Disorders of the Thyroid, Lymphatics, and Adrenal Glands.

SIMPLE GOITRE.

The conjunction of goître and pregnancy is very rare. If the tumour is already present it tends to rapidly increase if the woman becomes pregnant, or it may first appear during pregnancy.

RESULT.

During pregnancy the patient may be subjected to attacks of severe dyspnœa, which have in certain cases led to death by suffocation.

After labour, as a result of puerperal infection, the goître may become acutely inflamed, and an abscess may form therein.

TREATMENT.

Tincture of iodine and iodide of potassium may be given internally in increasing doses. Thyroid extract may also be given. Ionic medication may be tried, a saturated solution of iodide of potassium being introduced with the cathode by a current of 25 milliamperes for twenty minutes daily. Thyroidectomy has been successfully performed, also partial excision of the gland. It may be necessary to induce labour.

EXOPHTHALMIC GOITRE.

The disease may first develop during pregnancy.

SYMPTOMS AND SIGNS.

The symptoms of exophthalmic goitre are materially accentuated if the sufferer becomes pregnant. In some cases the goitre rapidly increases in size and demands attention. Moreover, the heart, already damaged by the persistent tachycardia, has an increased strain thrown upon it throughout pregnancy, and particularly during labour. The patient may be troubled with vomiting, may waste rapidly, and fever may appear. Slight jaundice may also be present.

A woman the subject of exophthalmic goître incurs much risk by becoming pregnant, and should be advised against it.

There is often improvement or disappearance of the symptoms after delivery.

TREATMENT.

In the event of pregnancy occurring, the practitioner must deal with the case according to the severity of the symptoms present. In all cases in which the disease is acute, or in which the symptoms are rapidly getting worse, the pregnancy should be terminated.

In cases in which it is deemed justifiable to allow pregnancy to proceed, absolute rest should be insisted on. In these patients the change from the lying to the standing posture may mean an increase of forty heart beats a minute.

In one marked case of this disease we had under our care the patient was kept absolutely at rest for many weeks before term, and finally passed through labour and the puerperium normally. At her previous labour she had given birth to a dead child, who had a goitre, but this time the child's thyroid appeared normal. Clifford White has reported a case in which both mother and child were affected.

If the case be judged on surgical grounds as suitable for partial thyroidectomy or ligation of the arteries, evacuation of the uterus should be first carried out.

Labour should be conducted so as to minimise the suffering as much as possible. It is not to be forgotten that patients with advanced exophthalmic goitre take a general anæsthetic badly as a rule, but very good results have been obtained with spinal anæsthesia. Morphine scopolamine or hedonal narcosis might well be tried in such cases.

If rapid delivery is called for, vaginal Cæsarean section is more suitable in the earlier months. With a child at or near full term the abdominal operation is the best.

MYXŒDEMA.

Pregnancy and myxœdema is a rare complication.

Occasionally women are met with who with each pregnancy exhibit a condition of mental apathy, delayed cerebration and sleepiness, probably due to deficient secretion of the thyroid gland.

RESULT.

In the reported cases pregnancy continued to term without any other complication, and the myxœdema did not increase in severity.

If eclampsia is sometimes due to deficient thyroid secretion and a resulting toxæmia, one would expect a patient with myxœdema unless rigorously treated with thyroid to be in danger of this very serious complication. There is no evidence, however, that such occurs. It is stated that the child may be a cretin, unless the patient is efficiently treated with thyroid extract.

TREATMENT.

Thyroid extract must be given, commencing with very small doses, and cautiously increasing them.

When the disease is known to recur with succeeding gestations, the question of evacuation of the pregnant uterus has to be considered.

Further conception should, of course, be advised against.

TETANY.

CAUSE.

The etiology of the disease is obscure, but it is usually held to be due to disease or atrophy of the parathyroid bodies. In pregnancy a certain number of cases have been associated with symptoms of osteo-malacia.

For some reason that has not been determined the complication of tetany and pregnancy appears also to depend upon the time of year and locality. Thus, in the recorded cases, it is found to be commoner between January and April, and to affect certain districts or countries. It is rare in England.

Tetany usually comes on in the later months of pregnancy, and may continue during the period of lactation. It is liable to recur if the patient again becomes pregnant.

SYMPTOMS AND SIGNS.

Tetany is indicated by painful and typical contractions of an intermittent nature commencing in the muscles of the extremities. The spasms, which are symmetrical, are preceded by a tingling and feeling of numbness in the parts to be affected.

The attack lasts from a few minutes to a few hours, and the patient retains consciousness throughout. In bad cases the movements may be very violent and productive of considerable exhaustion.

RESULT.

Tetany does not tend to shorten pregnancy, neither has it any effect on labour.

PROGNOSIS.

The complication, though most troublesome, is not usually dangerous and generally terminates favourably.

DIAGNOSIS.

Tetany might be mistaken for tetanus. In tetanus the spasm commences in the face and extends towards the extremities, whilst the back is rigid and extremely arched (opisthotonos). The contractions in tetanus are also constant and the mortality extremely high. Hysteroid conditions have also to be excluded.

TREATMENT.

Since the disease is attributed to hypo-parathyroidism, the administration of thyroid extract is indicated, together with such drugs as the iodides, chloral, opium or chloretone. During the height of the spasms, chloroform may be inhaled.

The spasms may be alleviated by massage of the affected muscles.

LYMPHADENOMA.

Hodgkin's disease may first declare itself during pregnancy, or pregnancy supervening upon it the course of the disease may be much accelerated, so that death during the last half of pregnancy or early in the puerperium may occur.

SIGNS.

The glands in the neck on one side first become swollen, as a rule. Gradually other groups of glands are affected, so that the axillary, bronchial and mediastinal glands become enlarged, as also does the spleen, and sometimes the liver. The resulting pressure on the bronchi and veins gives rise to paroxysmal coughing, œdema and ascites. The general signs are those of anæmia, fever and wasting.

Abortion is very common, and the anæmic condition of the blood leads to retro-placental and, after the birth of the child, to post-partum hæmorrhage.

The child shows no trace of the disease.

TREATMENT.

A localised collection of glands in the neck can be excised, but this, of course, is of no use if other glands are involved. The drug most likely to do good is arsenic, its administration having in some cases resulted in a cure. The pregnancy should be terminated.

ADDISON'S DISEASE.

The combination of Addison's disease and pregnancy is very rare. Only three cases have been reported. The disease always appears to have developed during pregnancy. In the reported cases labour was uneventful, but death ensued about the eleventh day of the puerperium from uncontrollable vomiting and collapse, even though the delivery had been induced. If a woman suffering from the disease becomes pregnant immediate evacuation of the uterus would seem to be indicated.

CHAPTER VII.

Disorders of the Nervous System.

PREGNANCY AND PAIN.

CAUSE.

Pain is a not uncommon accompaniment of pregnancy, especially in women who have previously borne children.

The common variety is probably due to the drag of the heavy uterus on its ligamentary structures, and is referred to one or both sides of the lower abdomen, usually about the situation where the ovarico-pelvic ligament crosses the pelvic brim. If only one side is affected, it is usually the left. In other cases, especially if the uterus be retroverted, persistent backache may be complained of.

Pain of this nature is apt to be most marked in the first five months. Later, as the uterus rises above the umbilicus it tends to disappear.

As constipation is very common during pregnancy, the patient is apt to complain of abdominal pain due to this condition and its associated digestive disturbances. In all women the pelvic joints become more movable during pregnancy; in a few this mobility is increased beyond the normal, with the result that walking becomes very difficult and painful, and aching in the joints, apart from walking, may also be troublesome.

Towards the end of pregnancy the pressure of the child's head on the nerves of the pelvis may cause pains of a sciatic nature, and the woman may also complain bitterly of cramp in the legs.

The mere distension of the abdomen, especially if the amount of liquor amnii is excessive, will also in some cases cause pain.

Besides these causes of pain there are others of graver importance, namely, incarceration, rupture or torsion of the gravid uterus, intestinal obstruction, pyelonephritis, appendicitis, and other causes of peritonitis complicating pregnancy, accidental hæmorrhage, especially of the "concealed variety," osteo-malacia, and lastly extra-uterine gestation.

These conditions are dealt with under their respective headings.

TREATMENT.

That variety of pain due to traction on the ligamentary supports of the uterus is difficult to treat. In early pregnancy relief may be given by inserting a pessary. If the abdomen is pendulous a

belt should be worn. In many cases little can be done beyond rest in that posture in which the pain is least felt, the regulation of the bowels, and the administration of sedatives and antispasmodics. The patient may be told of the likelihood of the pains passing off as pregnancy advances. If the pain is attributed to the laxity of the pelvic joints, a firm binder round the hips should be worn. If any of the graver causes of pain be diagnosed, the treatment proper for them must be adopted.

INSOMNIA.

CAUSE.

Sleeplessness during pregnancy may be due to many causes unconnected with this state. When due to the pregnancy *per se* it is usually met with in the later months, and arises from the discomfort of the enlarged abdomen or abnormally vigorous movements of the fœtus. It may also be a prelude to insanity or eclamptic convulsions, and further occurs in pernicious vomiting, chorea, and other toxic states.

Persistent insomnia after the birth of the child is chiefly seen either as an early manifestation of puerperal insanity or as a symptom of profound septic intoxication. Loss of sleep may also be caused by severe after-pains, or the pain of injuries to the genital canal, especially perineal laceration involving the anus.

TREATMENT.

Insomnia occurring either during pregnancy or puerpery must be treated by removing the cause, if that is possible.

As regards drugs, all the various hypnotics and nerve sedatives may be tried as the occasion seems to indicate. Opium and its derivatives should not be used except where the sleeplessness is due to pain. They are very inadvisable if there is the slightest doubt as to the mental stability.

The treatments of the different causes of insomnia will be found under their respective headings.

MENINGITIS.

Meningitis but very rarely complicates pregnancy or the puerperium, and when it does the patient is generally multiparous.

CAUSE.

The organism found in nearly all the reported cases has been the pneumococcus, but we have seen two cases secondary to puerperal infection in which the organism was a streptococcus.

Pelz has described a toxic variety, which is recovered from after delivery of the child.

SIGNS.

The disease is ushered in with headache, which may be present for a few days before the alarming signs appear.

The headache, which is most bitterly complained of, is succeeded by coma and occasionally by convulsions. The head is drawn back, the neck muscles being rigid, the tongue may be bitten, the teeth are ground, and the limbs are contracted or twitch. Vomiting may be distressing, and if the base of the brain is affected, strabismus or ptosis may be present together with contracted, dilated or unequal pupils. The temperature is raised, but the pulse remains more or less normal, and any increase in its rate is not proportional to an increase of the fever.

Meningitis during the puerperium will present similar features to those when it occurs during pregnancy. The disease as a rule supervenes two or three days after delivery. Cases have been reported where without any prodromal symptoms the patient twenty-four hours after labour has suddenly become comatose and died.

DIAGNOSIS.

Meningitis during pregnancy or the puerperium is most likely to be confounded with eclampsia or cerebral hæmorrhage. The diagnosis is, however, difficult, and many cases are at first unrecognised.

Whereas the headache of meningitis is very intense and persistent so that there is no intermission, the headache of eclampsia is irregular and very often accompanied by disturbance of vision. The coma of meningitis is complete, persistent and fatal, whilst the coma of eclampsia supervenes coincidently with the onset of the fit, varies in degree, is intermittent and not necessarily fatal.

In meningitis the quantity of urine is normal and albumen is absent, or its presence is due to some other cause. The urine in eclampsia is much reduced in quantity, at times to the point of suppression, and a large amount of albumen is generally present, so that at times it may be solid on heating.

Meningitis is accompanied by delirium of a violent character and terrifying hallucinations, which are both rare in eclampsia.

On lumbar puncture the cerebrospinal fluid in meningitis will be found to be turbid, whilst in eclampsia it is clear.

If meningitis is ushered in with a sudden coma, cerebral hæmorrhage may be mistakenly diagnosed.

The toxic variety is said to simulate very closely the symptoms of cerebral tumour.

PROGNOSIS.

The prognosis for the mother is very serious, nearly all the patients dying except in the case of the toxic variety. For the child the prognosis is not so bad, if it is delivered before the disease is too advanced, two-thirds of the children being saved.

TREATMENT.

If the disease appears during pregnancy and the child is viable, means should be at once taken to deliver it.

The further treatment consists in draining the meninges by lumbar puncture, and after a bacteriological examination of the fluid has been made, injecting the anti-toxic serum indicated by the variety of the infecting organism.

HYSTERIA.

Pregnant women are stated to be unusually liable to hysterical manifestations such as causeless depression, abnormal longings, and so on. Such phenomena are, however, met with quite apart from pregnancy, especially in mentally unstable persons, and in such the supervention of pregnancy may undoubtedly accentuate the natural tendency. On the whole, however, we believe that the liability of pregnant women to functional mental disturbances has been greatly exaggerated in the past.

When they occur the question of incipient insanity should be taken into account, and the case treated in the manner described on p. 107.

At times the hysterical manifestations become very marked and troublesome during labour, in which case the best treatment is to put the patient under the influence of morphine and scopolamine during the first stage, and to conduct the actual delivery under a general anæsthetic.

EPILEPSY.

According to Jardine and Aldren Turner, pregnancy increases the liability to fits in those previously epileptic. In a few persons the seizures only occur during those periods. Exceptionally, however, it may have the reverse effect, the fits ceasing during the gestation and recurring after the birth of the child.

DIAGNOSIS.

Where the patient is known to be an epileptic the diagnosis is as a rule easy, though epileptics are, of course, as liable to eclampsia as other persons.

It is from this latter disorder that distinction is important.

When the seizures supervene for the first time during pregnancy the simulation of eclampsia may be very close. This is especially so in the status epilepticus, a condition of frequently recurring fits that may come on acutely after labour, for as a rule eclamptic fits are multiple, whilst epileptic are single. In the absence of a definite history pointing to epileptic fits, the examination of the urine will help to decide the nature of the case.

It must, however, be remembered that occasionally albuminuria is not present in cases of eclampsia. The diagnosis from other causes of fits, such as hysteria or cerebral hæmorrhage, must be made on the ordinary criteria.

TREATMENT.

During Pregnancy.—It is undesirable that epileptics should marry; but if married, seeing the tendency that pregnancy has to accentuate the disease, they will be best advised if they avoid pregnancy.

A woman subject to epilepsy who becomes pregnant should be placed upon some form of the bromides, or being already so treated, the dose may be increased either in quantity or frequency.

Where the gestation produces a very marked acerbatory effect on the disease, the question of terminating the pregnancy is rightly to be considered, and with the less diffidence because of the liability of the mother to transmit the condition to her child.

If the status epilipticus supervenes, the patient should be placed under the influence of chloroform and immediate evacuation of the uterus proceeded with.

During Labour.—If the practitioner is called upon to deliver a woman known to have had epileptic fits during her pregnancy, it is advisable to minimise the sufferings and excitement of the second stage by instrumental assistance under general anæsthesia.

During the Puerperium.—The patient should not nurse her child, since if a fit came on during suckling the child might be seriously injured.

CHOREA.

CAUSE.

Primigravidæ are more likely to be affected with chorea than multigravidæ, and in many cases the patients have suffered from the disease when young, have had rheumatic fever, or have a hereditary tendency to neurosis. In a large number of cases the onset of the chorea is preceded by worry.

Most of the patients are between eighteen and twenty-four years of age.

SYMPTOMS AND SIGNS.

In nearly every case the chorea first declares itself in the third or fourth month, and differs from an average attack of chorea in a non-pregnant woman, inasmuch as emotional outbursts are common, there is impairment of sensibility, and a definite tendency to mania. Moreover, the violence of the movements are much greater, and the muscles become much weaker.

PROGNOSIS.

Chorea is a serious complication of pregnancy, and although mild cases may pass through this period safely, in 618 collected cases the maternal mortality works out at 19·9 per cent., whilst death of the child is common. In severe cases miscarriage or premature labour is likely to occur.

As a rule the disease improves after labour, and disappears in from two to three weeks. It may even be arrested in pregnancy, to reappear during the puerperium. It does not necessarily recur in subsequent pregnancies. French and Hicks point out that the occurrence of fever in the absence of any other cause is a most grave complication. The fatal results are due to exhaustion, endocarditis, or infection, and may be preceded by coma or hyperpyrexia.

TREATMENT.

The patient must be kept strictly in bed and placed on a liberal diet. One of the most troublesome complications is sleeplessness, and this may have to be treated with hypnotics. Massage may be successful.

The following drugs have been found useful in treating the disease: Alcohol, arsenic, chloral, strychnine, and sodium salicylate.

If the condition of the patient becomes serious from exhaustion, want of sleep, mania, or endocarditis, the question of inducing abortion or labour must be considered. Unfortunately this is not very successful in relieving the symptoms, frequently failing to do so. The mortality after inducing abortion or labour is higher than after spontaneous labour or abortion, 43 per cent. as against 33 per cent.

CEREBRAL TUMOUR.

The conjunction of a cerebral tumour and pregnancy has a special interest from the fact that symptoms (vomiting, con-

vulsions and coma) resembling eclampsia may be produced by the neoplasm.

In a case in the experience of one of us a single convulsion followed by rapidly fatal coma occurred shortly after delivery. At the autopsy a cyst due to the cysticercus was found in the brain.

HEMIPLEGIA.

CAUSE.

It is very rare for a hemiplegic person to become pregnant, but the occurrence of hemiplegia in pregnancy is more common.

The event may be due either to cerebral hæmorrhage, embolism, or thrombosis.

Cerebral hæmorrhage is more usually seen in elderly multiparæ with an alcoholic history. In patients dying of an eclamptic fit it is not uncommonly found to be the direct cause of the fatality.

Cerebral embolism is, as a rule, due to mitral disease, especially stenosis.

Cerebral thrombosis is the least common, and when occurring depends upon arterial degeneration, syphilitic or otherwise. Occasionally, however, hemiplegia occurs in young and previously healthy women for no obviously explainable reason. Similar apoplectic seizures may occur during labour or the puerperium.

TREATMENT.

During Pregnancy or the Puerperium.—The treatment of hemiplegia in pregnancy or the puerperium does not differ from that prescribed in women not pregnant. There is no reason to hasten the termination of gestation.

During Labour.—If the hemiplegia supervenes during labour the contractions of the uterus are not influenced by the lesion, but the degree to which the patient can help herself by voluntary effort is much diminished.

For this reason it is desirable to lighten the task of childbirth as much as possible by artificial assistance. The second stage should be conducted instrumentally and under anæsthesia.

PARAPLEGIA.

CAUSE.

Paraplegia during pregnancy is due, as a rule, either to injury to the spinal cord, myelitis, or neuritis. An acute type of myelitis associated with pregnancy has been described, but it is very rare.

SYMPTOMS AND SIGNS.

The symptoms and signs are those common to paraplegia apart from pregnancy.

RESULTS.

The paralysis has no effect on pregnancy or the puerperium, and renders the labour painless, but the uterine contractions are diminished in force.

TREATMENT.

During Pregnancy.—The treatment of paraplegia in pregnancy is to be conducted on the lines usual to the condition whenever occurring. If the pregnancy appears to cause increased distress, or if it is believed to stand in some causal relationship to the paralysis, the termination of the gestation is indicated. It is said that this proceeding has greatly improved certain cases of myelitis. As the uterine contractions are said to be somewhat diminished in force, while the auxiliary voluntary efforts are of course abolished, labour might with advantage be induced four weeks before term to lighten the work of the uterus.

During Labour.—The second stage should be conducted instrumentally, but since the vagina, vulva, and perineum are without sensation, it is not necessary to administer an anæsthetic, which would have the disadvantage of still further weakening the maternal forces.

MYASTHENIA GRAVIS.

This is a subacute or chronic disease, characterised by the rapid development of muscular fatigue on exertion.

The first muscles to become affected are those of the face, eye, and neck. As a result, the field of vision is impaired, diplopia is present, there is difficulty in swallowing fluids which are apt to regurgitate unless drunk very slowly, and the speech is slurred. The limbs become affected later, giving rise to a peculiar gait. The muscles regain their powers on rest, do not atrophy, and become quickly exhausted by a Faradic current but not by a galvanic.

If pregnancy complicates this disease, the patient becomes worse, and after delivery a fatal termination may quickly ensue.

On the other hand, certain cases have been reported in which the acerbation occurred only after labour.

TREATMENT.

The dieting must be carefully attended to, the food being given in a digestible form, and so prepared that it can be easily swallowed without mastication. It may be necessary to use the stomach tube.

The most useful drugs are arsenic, strychnine and cod-liver oil. Massage of the affected muscles sometimes gives relief. There is no particular indication to terminate the pregnancy. Cæsarean section has been found necessary in cases where the muscular effort of labour appeared likely to prove fatal.

NEURALGIA.

The pregnant state is peculiarly associated with functional disturbances of the nervous system. Of these, neuralgic pains especially affecting the cerebral and upper cervical nerves are very common. In many cases they take the form of headache, migrainous in type. In others the pain may be referred to the occipital region, or to the upper part of the back of the neck.

Neuralgic pains may be complained of in the limbs, especially the legs, in the latter months of pregnancy.

DIAGNOSIS.

Before making a diagnosis of functional pain, it is most important to exclude an organic cause. Thus headache is also typically seen in the toxic nephritis of pregnancy as a prelude to the occurrence of eclampsia. The urine should always be examined in these cases. Such causes of headache as cerebral tumour, syphilitic meningitis, or ingravescent apoplexy should also be borne in mind.

Neuralgia of the face is often due to dental caries.

Indefinite pains referred to the limbs, the spine, and the pelvis are present in early cases of osteo-malacia, and are often wrongly interpreted.

Severe pain in the legs may be due to incarceration of the gravid uterus in the pelvis, to the impaction of a tumour there, or to the pressure of the child's head against the sciatic plexus in the last month of pregnancy, whilst carcinoma, both of the cervix and rectum, may produce similar symptoms.

TREATMENT.

An organic cause for the pain having been excluded by thorough examination and the diagnosis of neuralgia established, the treatment should be carried out on the lines proper for such a condition, namely, the use of sedative and analgesic drugs, and the application of counter irritation by liniments, blisters, or the actual cautery, as the case seems to demand.

Inasmuch as certain of these cases probably depend upon the presence in the circulation of toxic substances derived from the gestation, the ingestion of water in large quantities by the help of

fluid diet is indicated. Many of these women are constipated, and in such the exhibition of saline aperients, with an occasional dose of calomel, is very useful.

NEURITIS.

This is a relatively rare complication of pregnancy. The neuritis may be limited to a single nerve, or the peripheral nerves may be affected. Bulbar paralysis may occur.

CAUSE.

The neuritis is due to an auto-intoxication.

SYMPTOMS.

The disease is generally preceded by headache and vomiting. The patient complains of severe pain along the affected nerve, which may be shooting in character, together with tingling and numbness. There may be disturbances of hearing, taste, and smell, and in some cases the patient will be irritable, suffer from hallucinations, and have other mental symptoms, a part and parcel of the toxæmia.

SIGNS.

In multiple neuritis the legs become affected before the arms, as a rule, so that in severe cases the patient may be unable to stand or raise the limb. The affected muscles rapidly waste, and there is diminished excitability to galvanism. Albuminuria may be present.

TREATMENT.

When the disease is limited to a single nerve the affected part must be kept absolutely at rest. The pain may be relieved by the application of hot fomentations, glycerine and belladonna liniment, or by the injection of morphia. Internally potassium iodide can be given a trial and salicylate of soda. After the acute stage has subsided, massage and galvanism will be indicated. In multiple neuritis the patient should be kept in bed, the general health attended to and the bowels well regulated. For the relief of pain the measures already indicated may be tried, as there is a risk of the contractions of the unopposed muscles resulting in deformities. Care should be taken to prevent the hands or feet from dropping, and the knees and elbows from flexing by proper appliances.

Massage and electricity will be found useful after a while.

If in spite of these measures the patient becomes worse, pregnancy must be terminated.

LOCOMOTOR ATAXY.

Cases of locomotor ataxy complicated by pregnancy are rare. The disease does not appear to have any influence *per se* on the gestation, though the child may be born dead because it is syphilitic. The uterine contractions are normal in force, but owing to the deficiency of sensation may be more or less painless. The voluntary bearing-down efforts may be absent from the same cause.

SPASTIC PARAPLEGIA.

Spastic paraplegia appears to have no effect on pregnancy, and labour is stated to be normal.

DISSEMINATED SCLEROSIS.

This disease, which at times appears just after childbirth, becomes markedly worse after labour. The parturition itself is normal. Evacuation of the uterus, as soon as the fact of pregnancy is clear, is therefore to be advised.

PARTURITIONAL PARALYSIS.

CAUSE.

The lumbo-sacral cord may be pressed upon during labour if the pelvis is too small or the head larger than normal.

The sacral plexus may also be injured during forceps extraction.

SYMPTOMS AND SIGNS.

The patient complains of great pain, which together with the paralysis is as a rule unilateral. Either the internal or external popliteal nerve is affected. In the former case the muscles at the back of the leg are paralysed, in the latter the peronei and the extensor muscles of the foot.

TREATMENT.

The leg must be treated as indicated under Local Neuritis.

DISEASES OF THE EYE.

Blindness.

Blindness supervening during pregnancy is nearly always caused by renal disease, either due to or associated with the pregnancy. It may be total or partial, and there are several types.

Uræmic Retinitis.—In this condition, where the urine is suppressed or partly so and eclampsia is threatening, the patient rapidly becomes quite blind, but no ophthalmic changes are visible

unless there was albuminuric retinitis present beforehand. In the absence of these, and if the patient recovers from her uræmia, the sight may be recovered completely.

Albuminuric Retinitis.—In this case the albuminuria is present before pregnancy. The patient may complain of mistiness, or the field of vision may be suddenly diminished at one spot, in which case retinal hæmorrhages are generally present, as well as typical inflammatory and degenerative changes in the retina and choroid at and around the yellow spot region.

Neuro-retinitis.—This is most often due to chronic renal disease. Apart from this, it may rarely occur in pregnancy and in too-prolonged lactation.

Retro-bulbar Neuritis.—The field of vision in front of the patient is foggy, at the sides clear. Vision is better in a dull light. It may affect one eye only. The ophthalmoscopic changes may be *nil*, and at most are limited to some blurring of the disc outline, especially on the temporal side, together with some evidence of venous congestion.

Nyctalopia may occur in pregnancy or during lactation. At times directly the nursing is stopped the patient recovers. It may recur in successive pregnancies, so that a patient has been thus affected on four successive occasions. Recovery may take place before the birth of the child. The vision may be normal in daylight, and nothing can be found on ophthalmic examination.

Retinal Detachment.—This occurs at times during severe eclampsia, usually in both retinæ.

The retina may be detached anywhere, though after a time there is always a strong disposition for the detachment to gravitate downwards, unless it undergoes spontaneous cure, which is a very rare occurrence. The loss of sight, which is usually sudden, is always great, depending on the extent and situation of the detachment, and particularly on the involvement or otherwise of the macular portion of the retina. The nature of the loss of sight is easily diagnosed by careful ophthalmoscopic examination.

INSANITY IN ASSOCIATION WITH CHILDBEARING.

The incidence of insanity in association with childbearing has been usually described accordingly as it manifests itself during one or other of the periods of gestation, puerpery or lactation.

While the first of these periods needs no definition, the puerperium is arbitrarily defined as the six weeks following parturition, and the lactational period embraces the whole time during which the infant is suckled—whether this be limited to the orthodox nine months, or

it be prolonged either through ignorance or a desire to inhibit another conception.

Mental disorder occurring during one or other of these periods is still frequently, though probably without justification, described under such terms as "the insanity of pregnancy," "puerperal acute mania," "lactational insanity," etc., and some text-books attempt to delineate these expressions, by special symptoms, as specific forms or varieties of insanity. Psychiatrists are, however, more and more recognise and teach that these so-called forms of insanity tending to do not exist as entities, and that not one of them possesses any set of mental symptoms by which it can be identified apart from the physical signs of the particular period of childbearingin question.

The practical lesson for the practitioner to learn is that an attack of insanity may manifest itself during any of the childbearing periods; that the attack may be an initial one, or a recrudescence of one or more previous breakdowns, or the precursor of future attacks; that in any of these events there may or may not be a family predisposition to insanity or some other neurosis; and that pregnancy, parturition—with which mention may be made of abortion—the puerperal state, and lactation are simply examples of the numerous stresses, mental and physical, which, under certain conditions not yet fully understood, may precipitate an attack of mental disorder.

Naturally, if the attack is an initial one, and still more so if the patient be a primapara, so much the greater is the distress and consternation of the husband and members of the patient's family. What is to be the immediate line of treatment? If evidence of mental disorder is showing itself during pregnancy, is abortion to be practised? In any event is the patient to be removed, or is an attempt to be made to carry out her treatment at home? Is the patient likely to recover? Is there a reasonable hope that the recovery will be permanent, or is there a probability that the present attack is the forerunner of repeated ones throughout the patient's life? Is the child likely to be weak-minded or specially liable to develop insanity? Should the mother be advised to avoid becoming again pregnant, or should operative measures be adopted to prevent her so doing? These are questions, some of which the practitioner must be able to promptly answer, and others of which he should be ready to at least discuss. If some of them are incapable of complete answer, they all can at least receive competent discussion if the matter be approached by a consideration of the following facts.

It should in the first place be remembered that, with, of course,

the exception of those of congenital origin and those belonging to the period of senescence, there is hardly any variety of insanity which may not develop during one or other of the periods of childbearing. It becomes therefore necessary for the practitioner to bear in mind at least the commoner, and on that account the more important, of those varieties which, so far as our present knowledge permits, deserve to be regarded as entities, and whose diagnosis carries with it a possibility of prognosis, not only as to the existing attack, but also as to any liability to future recurrence. To describe a case where active excitement occurs shortly after parturition as one of "acute puerperal mania," or, again, a case where depression —more or less profound, and perhaps accompanied by suicidal promptings—supervenes in the course of lactation as one of "lactational melancholia," is easy, but in neither instance amounts to a diagnosis, because the mania and melancholia, in the symptomatological sense in which those terms are commonly employed, may both be phases of the same variety of mental disorder.

VARIETIES OF INSANITY.

Among the members of the following two groups nearly all mental cases during childbearing can usually be classified.

Group A.—To take the group comprising the least probable varieties of insanity first, it may be stated that (1) incipient general paralysis, (2) epileptic insanity, (3) an early stage of paranoia, and (4) one or other of the alcoholic insanities, while possibilities, are usually eliminated without much trouble. Thus it is only rarely that there will be such a complete absence of physical signs as to cause the presence of general paralysis to be overlooked; inquiry, on the one hand, into the patient's history, and, on the other hand, into the mode of development of the attack, will usually suffice to put aside respectively epileptic insanity and paranoia; while a similar inquiry in both directions, together with a careful scrutiny of the prevailing mental symptoms, should make it difficult for a possible alcoholic origin to escape notice. Korssakow's special type of alcoholic insanity is not infrequently first noticed during a pregnancy or a lactational period; in the presence of the characteristic instantaneous type of amnesia, a tendency to fabrication and a history of alcoholism, it should certainly be suspected, and, should there be concomitant polyneuritic signs, it may be safely diagnosed.

Group B.—The following three varieties, (1) *dementia præcox*—embracing under that term all those forms of insanity the goal of which is a condition of so-called terminal dementia, and from which complete recovery cannot be expected; (2) *alternating* (otherwise

known as *periodic, circular,* or *manic-depressive*) *insanity*—implying thereby a constitutional and lifelong liability to attacks of excitement, depression, or stupor, of which attacks the precipitating cause in women thus liable is frequently the stress of one of the periods of childbearing; and (3) *confusional insanity*—including under this expression those cases in the causation of which either exhaustion or septic intoxication, or both, are the essential factors, and from which genuine recovery may be reasonably expected—are, however, those in which by far the majority of cases of insanity in association with childbearing will be found to fall. Any attempt to do justice to their symptomatology would be beyond the province of this section; but it must be obvious, from the above short definition of each, that it is in the third variety the practitioner will hope to be able to classify his case. Moreover, their differential diagnosis is frequently a matter of great difficulty, even in the hands of an expert in psychiatry, so that, except the medical attendant has had special opportunity of familiarising himself with the subject, prudence will suggest, particularly in cases where important issues may arise, the early calling in of such an expert, who, by assisting the medical attendant in the diagnosis, will enable him either to reassure or advise the friends in much more certain terms.

DIAGNOSTIC POINTS.

(*a*) *Period.*—(i.) Pregnancy is the least desirable of the childbearing periods during which insanity may arise. The ætiological factors which suggest a favourable issue are usually absent, and in their absence nearly all of such cases ultimately prove to be examples of dementia præcox or alternating insanity, the former class predominating.

(ii.) Parturition and the puerperal state provide, of course, plentiful opportunity for the occurrence of either exhaustion or septic intoxication, or both. Among certain classes of society, the shame and attendant stress of illegitimacy have to be reckoned with, and these may, by the mother's efforts to conceal her condition, have been the means of bringing about a very marked degree of exhaustion; besides which, there may, of course, be other causes of exhaustion forthcoming. With regard to septic intoxication, its presence, however clear, does not warrant the case being regarded as necessarily one of confusional insanity, for phases of alternating insanity are by no means rarely precipitated by the stress of puerperal sepsis. Nevertheless, such a condition, in the absence of a previous mental attack and of any family predisposition to

insanity, does lend hope to the case being of a favourable nature. If confusional insanity cannot be diagnosed, the case is more likely to be one of alternating insanity than dementia præcox.

The immediate prognosis in cases of insanity arising during the puerperal period is commonly looked upon as especially good. In the light of modern knowledge, such teaching, however, requires some degree of qualification. It probably owes its explanation to the fact that a large proportion of these cases are examples of either confusional or alternating insanity, and the statement would be more accurate if, instead of "prognosis" we were to say "immediate prognosis." If the case is one of the former variety, the ultimate prognosis may—subject to the remarks in the next paragraph but one—also be regarded as favourable; but if of the latter variety, the probability is that sooner or later other attacks of depression, excitement or stupor will supervene.

(iii.) Lactation may also provide cases in any one of the three groups. But it has this favourable significance, that under certain conditions, particularly when it has been prolonged beyond physiological limits, or when there have been several pregnancies in rapid succession, or when it has been associated with other debilitating influences, it is pre-eminently a very potent and common cause of exhaustion in its most typical form, so that, with evidence of the presence of exhaustion and in the absence of other determining factors, a diagnosis of confusional insanity may be warranted.

(*b*) *Previous Attacks.*—The question of previous attacks, or a family history of insanity—direct or collateral—should receive careful inquiry, and, in the event of either or both being revealed, the balance of probability is generally against the case being one of confusional insanity; but such a diagnosis is not necessarily ruled out, because there is, of course, no essential reason why a patient with a bad heredity should not have an attack of that variety of mental disorder and also a repetition of the same.

(*c*) *The Prevailing Type of Mental Symptoms.*—This is of paramount importance. It has already been stated that a full differential diagnosis in their light cannot be included here, for, while it is possible with a fair degree of accuracy to separate, for example, the excitement of a manic phase of alternating insanity from the catatonic excitement of dementia præcox, and both these from the delirium of confusional insanity, or, again, "circular stupor" from the stupor which characterises catatonia in dementia præcox, and both these from the stupor which sometimes accompanies exhaustion or is secondary to a condition of delirium, etc.,

yet the points of distinction are subtle, require much experience in their use, and would, for their adequate description, demand much more space than there is at our disposal.

Speaking broadly, mental symptoms may for our present object be grouped under five types: namely, those which are mainly delusional and those implied by the terms "stupor," "depression," "excitement," and "delirium." For practical purposes, it may be useful to remember that delusional states—where the delusions, usually of suspicion and persecution, all more or less fixed and often accompanied by hallucinations of several of the senses—are generally of bad augury; such states are commoner during pregnancy and lactation than in the puerperal period, and usually betoken what is sometimes spoken of as the paranoid type of dementia præcox. Most of the conditions of genuine stupor are also of ill omen; omitting those which may have been observed to supervene in the course of exhaustion or delirium, it may be stated that, with few exceptions, all those which arise during pregnancy belong to the catatonic type of dementia præcox, and that the remainder are examples of the phase of alternating insanity known as "circular stupor." A state of depression may belong to any of the three varieties of insanity under consideration, and cannot be distinguished without special skill. The same may largely be said about states of excitement, except that, in contradistinction to the more genuine excitement of catatonic mania in dementia præcox and that of a manic phase in alternating insanity, it may be borne in mind that the excitement in confusional insanity partakes rather of the nature of delirium. Lastly, it may be emphasised that usually the most conspicuous symptom of confusional insanity is confusion, in degree varying from a clouding of consciousness to actual delirium, with the presence of hallucinations, generally limited to the auditory and visual senses.

TREATMENT.

From what has already been said as to the many varieties of insanity, whose onset may be in one or other of the periods of childbearing, it is obvious that a full account of their treatment would be out of place here; it is therefore intended to limit these remarks to such points as have a practical bearing upon their associationship with pregnancy, the puerperium, or lactation.

Treatment at Home.—No matter in which of these periods the mental disorder develops, one of the first problems to present itself will be whether the patient may be allowed to remain at home and undergo her treatment there. No hard and fast rules can be laid

down for guidance on this point, and every case must be decided on its merits.

Speaking generally, it may be stated that there can, however, be only very few cases in which the treatment itself is likely to be more effective by reason of its being carried out at home; on the contrary, it should be remembered that in by far the majority of all cases of mental disorder, the removal of the patient, from both relatives and immediate surroundings, is one of the most salutary measures, and in certain cases no treatment begins to be effective until that step has been carried out. It should also be borne in mind that treatment at home involves the risk of the patient being found on recovery to harbour such a dislike of the associations connected with the mental illness as to necessitate their permanent change. There is further the pecuniary aspect; for if the patient is to have all the advantages which a well-equipped modern hospital for mental diseases can offer, treatment at home, or even—by way of compromise—at some other private house, will be very costly.

In the event of such compromise being adopted, the practitioner should be familar with, and should caution the relatives against infringing, section 315 of the Lunacy Act of 1890, by which it is illegal for anyone for payment to take charge of a person of unsound mind except such person be certified under the Act.

If the question of treatment at home arises towards the end of pregnancy, and the relatives can afford the expense involved, the physician is on sentimental grounds certainly justified in recommending the adoption of such course, at any rate until labour is over, in order thereby to spare the child the possible stigma of being born in an institution for the insane. But apart from such a valid reason, the relatives, in order to avoid corresponding stigma to the patient herself, will in many instances refuse to allow her to be sent to an institution, and the physician must be prepared to act accordingly.

In the first place, the infant, if the case is a puerperal one, must be at once removed from the mother, and, in whatever period the attack has occurred, access to the patient by any other young children there may be in the house must be strictly forbidden. It cannot be too strongly insisted upon that, however mild the symptoms may appear to be, there is a constant liability to sudden manifestations of both suicidal and homicidal impulses, and that by reason of the latter, the infant and any other young children are in jeopardy.

In passing, allusion may here be made to the statement sometimes made that these insane impulses, together with a proneness to take

sudden dislikes towards the husband and those in immediate attendance on the patient—the whole picture tinctured with marked erotism and obscenity of expression—are specially symptomatic of insanity in association with childbearing particularly in the puerperal period. This is an incorrect mode of expressing what is undoubtedly a fact: namely, that while a large proportion of mental attacks during periods of childbearing are of the types which manifest these symptoms, yet quite as many cases present the same type of symptoms, not only without association with childbearing, but also in women who have never been pregnant. Somewhat different and of much legal interest are the instances of infanticide by unmarried women of their illegitimate offspring, in which case the law usually takes a lenient view and the mother is regarded as insane at the time of the act.

To return, however, to the measures to be taken for successful treatment outside an institution. A suitable room or rooms, preferably on the ground floor, must be set apart for the patient and an adequate staff installed; as a minimum, the latter will probably consist of a nurse for night duty, who must have prompt means of summoning assistance if required, and two nurses for day duty, all of whom should have had training in mental nursing. If rooms on the ground floor are not obtainable, means must be taken to prevent the windows being used by the patient for precipitation therefrom. In either case all obvious means of suicide must be protected or removed; in particular is this precaution needed in the lavatory, water-closet or other places where during convalescence the patient may happen to be left alone, and the removal or protection of the bath-taps is an additional safety. The strictest caution against leaving knives, scissors or other implements of danger about must be enjoined, and against leaving any fire or light unprotected by an adequate guard. If desired, it is possible to obtain, for use at table, a knife the cutting part of the blade of which is restricted to about an inch. But however closely such measures of safety are taken, they will inevitably prove unavailing if the supervision is not, in the strictest sense of the word, constant; and the golden rule to be impressed upon those in charge is that, under no circumstances, must the patient be allowed out of sight for so little as a moment, until a relaxation in such regime is ordered by the doctor.

Chief Therapeutic Measures.—Those on which most reliance can be placed consist of the administration of adequate nourishment; the securing of rest in bed during the acute stages—and of a sufficiency of sleep, both these being best obtained as far as possible

in the open air; and the maintenance of a free action of the skin and bowels.

The diet should be plain and plentiful, and include a liberal allowance of milk. Partial or complete refusal of food is an obstacle which is very frequently encountered, and, if the nurses are unable to coax the patient to take sufficient, there must be no delay in resorting to forced feeding. The easiest and safest method of accomplishing this is by the use of the nasal tube and glass funnel, and the minimum of pain and discomfort are felt when the tube is of full size. If such means becomes necessary, the patient should be fed twice or thrice daily, and should receive in the course of the twenty-four hours 3 pints of warm milk, three eggs and 3 oz. of sugar, to which may be added, if there are indications for the use of stimulants, some whiskey. This "feed" can be varied by the substitution of strong vegetable soups.

It is in the securing of rest and sleep to very acute cases that the advantage so often lies in a well-equipped institution with its specially planned verandahs. Under the latter the patient can be kept in bed, not only all day, but, if thought desirable, during the night as well. There is no better soporific than open air and sunlight, but blistering from the latter is a danger against which the patient must be shielded. Another very powerful means of allaying acute excitement and promoting sleep is by the use of what is sometimes termed the "continuous bath"; in other words, by allowing the patient to remain immersed in water maintained at a temperature of 100° F., for periods varying indefinitely from half an hour upwards: for such purpose several institutions possess baths attached to which is an automatic syphon apparatus, which obviates the necessity of the nurse having to constantly watch the temperature and replenish the water. In the absence of either such special baths or of a verandah, the practitioner must fall back on his ingenuity to devise other means to effect the same result. An hour's sleep so procured is worth several that have been obtained only by the use of hypnotic drugs, which are to be as far as possible avoided. But in many cases it becomes imperative to use them. Their number is legion, which does not speak well for their efficacy; but the following are the most serviceable: Paraldehyde, once or twice a day, in doses of ʒj, ʒij, ʒiij, with or without 30 to 60 gr. of potassium bromide, is safe and efficacious. Chloral where there are no cardiac or circulatory contra-indications, is sometimes useful in doses of 15, 20 or even 30 gr., with or without potassium bromide, twice or thrice in the twenty-four hours; but it quickly produces a coated tongue, and should not be given many days in succession.

Veronal, as a single dose of 10 gr., or with caution 15 gr., often quickly produces sleep. Allied to it is sulphonal, which can be given in doses of 15, 20 or 30 gr. twice a day; its effect is not produced until after a lapse of two or more hours. Owing to its reputed liability to produce hæmato-porphrynuria it should not be given on many consecutive days, and cascara or some other laxative should be combined with it. Trional acts intermediately between the last two drugs, and may be prescribed in doses of 10 to 15 gr. Opium is usually stated to be contra-indicated, but $\frac{1}{6}$ gr. of morphia combined with hyoscin hydrobromate, $\frac{1}{100}$ gr. hypodermically and increased, if well borne, up to $\frac{1}{4}$ gr. and $\frac{1}{75}$ gr. respectively, often proves of great value in overcoming very acute excitement. It is sometimes of advantage to give $\frac{1}{100}$ gr. of the latter drug just prior to the use of a continuous bath which it is desired to prolong for several hours.

A free action of the skin and bowels are to be effected by the usual means. The former, which is of much importance in toxic cases, is greatly aided by the use of the continuous bath; while, to obtain the latter, a daily enema is often necessary.

As the acute depression, stupor, excitement, delirium or exhaustion—as the case may be—disappears, rest in bed will give place to graduated exercise. It is during the period of convalescence that difficulty is experienced in gauging how much relaxation in the rigidness of supervision may be allowed; and it is well to remember that a large proportion of suicidal acts are done just prior to the acme of depression being reached and soon after its relaxation. A good index is the return of the patient to her normal weight. In this stage strychnine and phosphoric acid are indicated, and to promote the return of the catamenia, iron and aloes are often necessary. If the patient remains dull, indolent or lackadaisical, and if convalescence appears to stagnate, a course of treatment with thyroid extract may prove a powerful fillip, and indeed it may be stated that, if it effects no response, the outlook is grave and the onset of dementia is probable.

Treatment in Particular Cases.—While the above measures are applicable in general, the following points have reference to the particular period of childbearing in which the attack has occurred:

If the morbid mental symptoms develop during gestation, the question whether pregnancy should be terminated will arise; and to this the answer, in by far the majority of cases, will be in the negative; for experience shows that there is usually no tendency to a cessation of the mental symptoms, either when abortion occurs in the course of insanity or coincidently with normal labour when the pregnancy is allowed to run its full course. Nor need this

occasion surprise when it is remembered how unfavourable a class most of these cases of insanity during pregnancy prove to be. Exception may perhaps be made in those instances where, somewhat in the nature of an idiosyncrasy, there exists an overmastering fear of death during labour or that the child may prove to be an idiot or deformed, etc., and where there is reason to think the insanity is the direct outcome of such dread. Again, when the patient has had two or more pregnancies and has not been able to pass through one without a development of an attack of insanity during the puerperal period, it may be justifiable to terminate the pregnancy. Apart from such comparatively rare circumstances as these, abortion cannot, on the ground of the onset of insanity, be recommended.

If, however, there are present any such circumstances justifying abortion, there arises the further question as to whether operative measures to prevent the future occurrence of conception may be undertaken. In our opinion they may under the same strict limitations be properly recommended. Prudence will, however, dictate that a consultation with a colleague or colleagues should be insisted upon, that the nature and permanent effect of the operation be fully explained, and that adequate testimony be obtained that the patient is free from symptoms of certifiable insanity at the time she gives her consent; it may also be a wise precaution to obtain a letter of indemnity.

These measures have, of course, a "eugenic" aspect, and may be pressed upon the practitioner with the aim of frustrating the birth of offspring predisposed to insanity. We would, however, emphatically assert our belief that, no matter how great may be one's sympathy with such object, there is at present altogether insufficient data to warrant our interference with the course of nature. Nevertheless, in our view, while until those data are forthcoming, the physician should refuse to countenance such measures, in so far as their aim is directed to the next generation, he may yet with entire propriety give his consent thereto, so long as the present or future welfare of the patient is their goal.

Of the cases that develop in the puerperal period, by far the majority occur immediately at or within the first two weeks after parturition. Besides adherence to the principles already laid down, stress may be laid on the following points: Attention to the breasts, on removal of the infant, will be required; and should it be desired to employ belladonna beneath a supporting bandage, a liquid form should be prescribed in lieu of plaster, to obviate the use of the latter with possible suicidal intent. Pyrexia or other

evidence of toxæmia calls for a search for a possible focus of origin, and the usual measures to combat puerperal sepsis should be taken. Sponging, as in other instances of high fever, may be helpful, but the use of the continuous warm bath is here again of the utmost value. Polyvalent serum has sometimes been used with marked benefit in clearly toxic cases, and it is worth while making sure that it is at hand, especially if any tendency is noticed to the development of multiple superficial abscesses, as are not unfrequent in the acutest of these cases. Incontinence and loss of sphincter control demand scrupulous care to maintain cleanliness and dryness in order to ward off the development of bed sores.

Of the cases that arise during lactation, most belong to the poorer classes, and on this account quickly pass from the hands of the general practitioner to those of the asylum physician. Delay in taking the necessary steps for the patient's removal to an institution, or for setting in motion adequate home treatment, is fraught with much danger, and may bring about one of the family crimes with which from time to time the public is shocked. In the hope that the origin of the breakdown is simple exhaustion, removal from home cares and worries, the administration of abundant food, with such tonics as iron, arsenic, strychnine, and phosphoric acid, are chiefly indicated in these cases, with the object of restoring bodily vigour as quickly as possible, coincidently with which the mental faculties in favourable cases may be expected to resume their normal energy.

THE MARRIAGE OF FIRST COUSINS.

The practitioner will occasionally be consulted as to the advisability of first cousins marrying.

Statistics are available dealing with the inmates of asylums, deaf and dumb institutions, and with isolated communities and families in which consanguineous marriages have taken place. An examination of these statistics will disclose the fact that the offspring of such marriages are not unduly represented in the asylums, and in isolated communities, where intermarrying has necessarily resulted, the health and mental acuteness of the members have not deteriorated.

There is nothing, therefore, in the marriage of first cousins *per se* that necessarily leads to a deterioration of health, or to mental weakness in their offspring.

The subject must be approached rather from the side of inheritance, for it is apparent that in the marriage of first cousins there must be an increased risk of the transmission of any family

weakness or disease, since one parent of each of the contracting parties will come from the same stock.

It may therefore be stated that if the health record of the parents of first cousins is shown to be a good one, such a marriage as that under discussion would usually be safer than marriage into a family in which no such guarantee could be obtained.

This view is further borne out by the highly interesting facts gathered from an inquiry into the marriage customs of the Fiji Islanders. The reader who desires an opportunity of ascertaining the effect of intermarriage of first cousins persisted in through many generations is strongly recommended to read the chapter on the marriage system in Basil Thomson's book, "The Fijians," who, as a race, provide in this connection an anthropological phenomenon which is probably unique and which goes far to indicate that one class of cousin marriages may prove to be of positive benefit to the next generation.

E. N. Ross writes: "The Bakhtiaris, one of the most advanced tribes in Persia, make it a rule that a man's wife should, if possible, be his first cousin, preferably his father's brother's daughter. Contrary to my preconceived ideas, I found the children of such marriages as a rule mentally and physically superior to the children of the other wives, though brought up under precisely similar conditions."[1]

[1] *British Medical Journal*, March 21st, 1914.

CHAPTER VIII.

Disorders of the Heart, Blood Vessels, and Blood.

The increased arterial tension and amount of blood normal to a pregnant woman would in all cases lead to a dilatation of the heart were it not that it is accompanied, when this organ is sound, by a compensatory hypertrophy.

When, however, valvular disease of the heart is present, this hypertrophy may fail and dilatation take its place. This failure of compensation is favoured by the anæmia, and in some cases by the toxæmia of pregnancy, while as the result of labour pains, the blood pressure is greatly raised and the strain on the heart reaches its maximum.

Finally, if the puerperium be septic there is a liability for chronic valvular disease to pass into the acute ulcerative variety.

ACUTE HEART DISEASE.

This is a rare complication of childbearing and a very fatal one. As in non-pregnant women, two forms are found, a simple and ulcerative.

CAUSE.

Both conditions are due to infection by micro-organisms. Acute endocarditis is usually superposed on a chronic valvular disease secondarily to some infective process already present. Rarely it is primary.

SYMPTOMS AND SIGNS.

Simple Endocarditis.—This form, unless it passes into the ulcerative variety or the compensation has failed, may not give much warning of its presence. The heart action will be a little irregular; bruits may be heard, and there may be a slight continued fever with nothing else to account for it.

Ulcerative Endocarditis.—In ulcerative or malignant endocarditis, as it is sometimes called, there are two distinct types, the typhoid and septic, the symptoms of each of which may be recalled to the reader.

Typhoid Type.—In these cases the rise of temperature is fairly regular; there is great prostration, sweating, and a low delirium; the bowels may be relaxed, and a rash may be present on the skin.

Septic Type.—This is the type more likely to be met with in puerperal women. The temperature is high, markedly irregular, rigors are common, the pulse is rapid, palpitation may be marked, and the patient presents the picture of an acute septicæmia or pyæmia.

In either of these types there may be every variety of cardiac distress, or the symptoms may be chiefly cerebral with meningitis.

In simple and ulcerative endocarditis the symptoms of embolism, such as hemiplegia or infarction of the spleen, kidneys, or lungs, are common.

DIAGNOSIS.

The diagnosis is arrived at by a consideration of the signs and symptoms found on examination. In all febrile conditions in the puerperium, the heart should be examined, especially where with few uterine signs the patient presents marked fever and other symptoms of septic infection.

TREATMENT.

In the simple variety the patient must be treated on the same lines as is indicated under chronic valvular disease.

The ulcerative variety must be treated by the usual methods as described in text-books of medicine. Sera and vaccines are specially indicated, and the blood must be examined for micro-organisms.

CHRONIC HEART DISEASE.

Chronic endocarditis as a complication of pregnancy is probably a much commoner event than recorded cases or personal experience would lead one to suppose, since if the compensation is complete and the woman shows no sign of cardiac mischief its presence is apt to escape detection.

VARIETIES.

Any variety or combination of valvular disease may be noted. In two-thirds of the cases mitral disease is present alone, aortic disease being but rarely found. The usual lesion is mitral regurgitation; after this mitral regurgitation combined with stenosis is the commonest.

PROGNOSIS.

As a rule the patient passes through pregnancy, labour, and

the puerperium without any trouble at all. In these cases the compensation has been sufficient. Again there may be no definite trouble during pregnancy, labour, and the early puerperium, but the patient's condition is in the end decidedly worse than before she became pregnant. These cases one is apt to lose sight of, especially in hospital work, and it may therefore very well be that the prognosis in these apparently compensated cases is not quite so good as one's hospital experience would lead one to believe.

If, however, the compensation fails during pregnancy, then heart disease becomes a very grave and formidable complication of that state.

The failure of compensation is fortunately comparatively rare in women, at any rate with their first children. Hicks and French have shown that it averages about 8 per cent. with the first child, and 15 per cent. with the fifth child, and that the average number of children borne by 300 women chosen consecutively with heart disease was 4·5.

The prognosis further depends upon when the compensation fails; if late it is much better, if before the sixth month it is bad, and the prognosis is apt to be worse for primiparæ, on account of the prolonged labour. Hydramnios, which is not an uncommon accompaniment of failing compensation, increases the risk.

The symptoms most to be feared are those of œdema of the lungs and syncope, which are apt to supervene during or just after labour. The greatest risk is not during the labour, but just after or soon after, most of the patients passing through the actual labour safely.

Again, in some cases the compensation fails up to a certain point only, as, for instance, in one of our cases where the patient passed through a full-term labour without any serious distress, in spite of the fact that she had very serious œdema of the lower half of her body, with great swelling of the vulva, hydramnios to the extent of 5 pints, and twins aggregating in weight over 14 lb. The prognosis is further influenced by the state of the lungs and kidneys, so that with emphysema and albuminuria the outlook is very much worse.

The prognosis for the child is bad; the fœtal mortality is over 50 per cent., labour being prematurely terminated in from 20 to 40 per cent. according to different observers. This is due to death of the fœtus from deficient aeration or from placental hæmorrhages, the congested endometrium forming a very unsatisfactory decidua, and leading to a less firm attachment of the placenta.

TREATMENT.

During Pregnancy.—Cases of failing compensation due to pregnancy are comparable to those of overstrain in non-pregnant women with chronic heart disease, and must be treated in a similar way.

The treatment may be considered under the following headings:

Cases in which it is not necessary to terminate Pregnancy.—The mere fact that a pregnant woman has heart disease is no indication that pregnancy should be terminated, for when compensation is fully established or when the treatment about to be described is successful, the patient will go to term and pass through labour safely. The patient must therefore be watched most carefully for signs of cardiac failure, and, should such declare themselves, she must be put to bed and kept absolutely at rest, and everything must be done to mend the compensation. Special attention should be paid to the action of the kidneys and the bowels, and digitalis, strychnine, and alcohol may be needed.

Cases in which Pregnancy must be Terminated.—If compensation fails before the sixth month, or if the treatment already indicated fails after a fair trial, pregnancy must be terminated. There is a tendency to postpone doing so until the indications are very marked. This should be guarded against.

Tuskai has called attention to the fact that whereas a normal heart accelerates some ten beats per minute after rising from the sitting position to a standing one, in a patient with hypertrophy of the heart this difference is not evident. He has noted that in pregnant women with a failing compensation this difference again becomes marked, and considers therefore that it is an indication for terminating pregnancy.

Cases in which it is expedient to terminate Pregnancy.—If it is known that in the previous pregnancy the heart symptoms were greatly exacerbated, or that apart from pregnancy there had been a recent threatened failure of compensation, and finally in those cases where compensation, though not actively failing, has apparently reached its limit and the child is viable, it is expedient to terminate pregnancy.

Method of terminating Pregnancy. The method of terminating pregnancy, whether this be indicated by expediency or necessity, must be chosen according to the state of the patient. Where this is not urgent induction is to be advised. If, however, the condition of the patient is precarious a more rapid delivery than can be effected by this means is desirable. In such case Cæsarean section either by the abdominal or vaginal route is indicated. In general we believe that the abdominal route is the best, for not only can

the child be delivered more quickly, but the operation can be concluded in a shorter time, moreover the patient can be sterilised. We consider that vaginal Cæsarean section should be limited to those patients who are not more than seven months pregnant and whose vagina is capacious.

During Labour.—First Stage.—If the symptoms are urgent, and especially with œdema of the lungs, the membranes can be ruptured, when the decrease in pressure occasioned thereby may give considerable relief. If no relief is gained delivery must be accelerated by artificial dilatation of the cervix or Cæsarean section.

Second Stage.—As soon as the cervix is fully dilated the child should be delivered by forceps or traction on the breech so as to shorten the second stage.

Anæsthesia in Cardiac Cases.—The patient should be given chloroform if the state of the lungs will allow, as this will diminish the strength of the uterine contractions and lessen the excitability of the patient. If the condition of the lungs is so bad that chloroform is quite contra-indicated and yet it is necessary to carry out some operation where anæsthesia is imperative, this effect may be obtained by the use of gas and oxygen or by spinal anæsthesia, which latter method we successfully employed when delivering a patient with heart disease by vaginal Cæsarean section.

Third Stage and After.—It is in the third stage that the greatest danger exists, sudden or very rapid death from cardiac failure or over-distension of the right heart being usually the cause of the fatal termination in these cases.

The greatest watchfulness must therefore be exercised. If the pulse is weak and irregular, and if cyanosis gives evidence of over-distension of the right heart, post-partum hæmorrhage should be encouraged. On the other hand, the right heart may not be dilated, and from the rapid decline in the intra-abdominal pressure the blood may be determined to the large abdominal veins. To prevent this, which may lead to syncope, the abdominal binder should be drawn very tight, and in addition a sandbag should be placed upon the abdomen. The patient must be carefully watched for the forty-eight hours following labour, and will not be out of danger for three weeks.

As already pointed out, one of the most serious complications is acute or subacute œdema of the lungs, in which there are attacks of distressing dyspnœa, combined with a continued rapid respiration, and an expectoration of large quantities of white and pinkish frothy fluid. A very good drug for these cases is strophanthus, whilst ipecacuanha and tartar emetic, nitrate of amyl

and nitroglycerine may be found useful, and the patient may also be bled with advantage. Injections of camphorated oil, 10 per cent., are also recommended, and if possible a supply of oxygen should be at hand.

The nature of the lesion has a certain bearing on the complications likely to be met with. Thus, for instance, with mitral regurgitation, œdema will be likely; with mitral stenosis, hemiplegia, cerebral embolism or post-partum hæmorrhage; with aortic disease, syncope.

Marriage.—The question of marriage has for long excited a good deal of discussion. It is a very important one and will be actively brought before the practitioner. Some authorities maintain that women with chronic valvular disease of the heart should not marry. There can be no doubt that marriage, with its attendant chance of childbearing, does increase the risk of valvular disease. We have shown that in most cases no immediate harm at any rate results, and whether the inevitable heart failure appears sooner in the majority of women who have borne children than in those who are sterile or forced to sterility we very much doubt. There are other causes of overstrain besides childbearing.

Women with proper compensation can marry, but in those in whom the compensation is weak or failing, or where other diseases such as tubercle and kidney disease are also present, then the practitioner should take a firm stand on the matter and, as far as he is concerned, refuse to countenance it.

PERICARDITIS.

CAUSE.

Pericarditis in pregnancy is usually an accidental complication, but may be secondary to pregnancy chorea.

During labour, pericarditis, especially when associated with much effusion, is an extremely grave event, leading sometimes to sudden death as in a case in our experience.

In the puerperium, pericarditis is almost invariably secondary to genital sepsis, and as such is a very serious condition.

TREATMENT.

Pericarditis associated with childbearing is to be treated in the same way as when not so connected.

In labour thus complicated the propriety of tapping a large effusion would have to be taken into consideration. The labour should be assisted. A general anæsthetic for this purpose would be inadmissible, but morphine scopolamine narcosis would appear to be indicated if there was much pain and distress.

VARICOSE VEINS.

Varicose veins may occur in the lower extremity, vulva, or rectum (hæmorrhoids). The latter are discussed on p. 43.

The Lower Extremity.

Pregnancy is a strong predisposing cause of varicose veins of the lower extremity, and in many women thus suffering the varicosities first arose during a pregnancy. In some persons it is only during pregnancy that the veins become troublesome.

If a woman with varicose veins of the lower extremity becomes pregnant, the varices greatly increase in size, especially in the upper part of the thigh.

PROGNOSIS.

As a rule, during pregnancy, labour, or the puerperium, no ill results follow this complication, but occasionally during pregnancy the veins may become inflamed. This liability to phlebitis and thrombosis is augmented in the puerperium. Such thrombosis has been the cause of pulmonary embolism. Rarely a vein has burst.

TREATMENT.

It is undesirable that a patient suffering from bad varicose veins of the lower extremity should become pregnant, but it is very rarely justifiable to induce abortion or premature labour on this account.

During pregnancy no operation on the enlarged veins is advisable. Elastic stockings or indiarubber bandages may be worn, but the modern elastic crêpe bandages, which fit better and can be washed, will be found more comfortable. The legs should be kept raised as much as possible. If phlebitis supervenes, strict confinement to bed with the leg in an elevated position must be insisted on. The pain can be relieved by a compress continually kept moist with an evaporating lotion, or the affected area may be painted with glycerine and belladonna, on the top of which warm fomentations should be applied.

The Vagina.

Varicose veins may be situated in the vagina and their presence remain undetected during pregnancy.

PROGNOSIS.

The condition, which is a very rare one, may be a cause of severe or even fatal hæmorrhage during pregnancy.

If a vein becomes thrombosed and the tissues in its immediate neighbourhood infected, a mistaken diagnosis of chorio-carcinoma may be made, since both may present in the vagina as a purplish red nodule, slightly ulcerated round its base. Conversely and more commonly a secondary growth of chorio-carcinoma has been mistaken for a thrombosed varicose vein.

The Vulva.

Varicose veins of the vulva may attain a very large size during pregnancy.

We have had cases where the veins have been larger in diameter than a lead pencil, not only occluding the vaginal orifice, but also coursing up over the mons veneris on to the lower abdomen and down on to the upper part of the thigh.

PROGNOSIS.

Varicose veins of the vulva rarely give rise to serious trouble. Occasionally they have ruptured during pregnancy or labour.

If the rupture is external, very profuse hæmorrhage occurs. If it is internal, a condition known as *hæmatoma vulvæ* results, which may prove an obstruction to the delivery of the child or of the placenta, and to the escape of the lochia.

TREATMENT.

In the Early Months of Pregnancy.—In the earlier months if the veins have obtained a large size and are already beginning to give trouble, they should be excised.

The operation is a simple one and is thus performed:

The pubes having been shaved and the parts rendered as sterile as possible, an incision is made over the varicosities and the mass is carefully dissected free of the subcutaneous tissue.

A ligature is then applied at either end, and the intervening portion is excised. All bleeding points having been secured, the wound is then closed with interrupted silkworm sutures, which are removed on the seventh day.

Late Pregnancy.—During the later months of pregnancy, operation upon the veins is not advisable; but if they are of such a size and in such a situation that they are likely to prove an obstacle and danger to delivery, as in three of our cases, labour should be induced by bougies, postponing the operation if possible until the child is viable.

The treatment of vulval hæmatoma will be found on pp. 284 and 305.

THROMBOSIS OF THE INTERNAL ILIAC VEIN.

Death from this complication has occurred during pregnancy, thrombosis spreading upwards into the inferior vena cava and so into the right heart.

No cause was discovered. The illness commenced with swelling of the leg and terminated fatally eleven days later, vomiting being very persistent.

GANGRENE OF THE EXTREMITIES.

CAUSE.

Although gangrene necessitating amputation has been reported seventeen days before labour, it nearly always follows that event, and is due to infection causing venous or arterial thrombosis, to septic endocarditis leading to an arterial embolism, or to an embolus the result of a pre-existing rheumatic endocarditis. Endarteritis obliterans has also been occasionally found.

The lower extremity is most commonly affected. Three cases are on record in which the breast become gangrenous.

Gangrene may also result from the pressure of one portion of the body against another when the patient is unconscious, as, for instance, after an eclamptic fit, when the patient may lie for hours with her arm underneath her back, or have one foot resting on another.

SYMPTOMS.

The patient complains of great pain, often of sudden origin, in the affected limb.

SIGNS.

The legs are more often affected than the arms. In most cases this complication supervenes during the second week in the puerperium, and it varies in intensity from superficial necrosis to gangrene of the whole limb. There is no pulsation in the artery distal to the embolus. The gangrene may be dry or moist.

The eclamptic cases have resulted in the skin, on which there has been pressure, sloughing, abscesses forming in the soft parts, and the ankle joints becoming disorganised.

PROGNOSIS.

The condition is a very grave one, most of the patients dying in spite of amputation.

TREATMENT.

The limb must be raised and kept warm. It may be necessary to give morphia to ease the pain. The strength of the patient must be conserved by suitable diet and tonics, and when necessary and possible the limb must be amputated well above the line of separation.

THROMBOSIS OF THE MESENTERIC VESSELS.

Thrombosis of one of the mesenteric vessels in connection with childbearing is a very rare event. One case has come under our notice. The patient had been confined four weeks previously and the puerperium was septic owing to infection of a badly ruptured perineum.

SYMPTOMS AND SIGNS.

The onset of the disaster in our case was acute with violent abdominal pain, intense anæmia, and other symptoms strongly suggesting internal hæmorrhage. On the abdomen being opened the peritoneal cavity was found full of foul-smelling blood, and the entire length of small intestine was of a purple-black colour due to vascular engorgement. The patient died.

In this case thrombosis of the superior mesenteric vein had probably occurred, owing to infection spreading from the recto-vaginal septum along the peri-venous lymphatics of the lower tributaries of the portal area.

ANÆMIA.

Simple Anæmia.

As a rule women are not anæmic during pregnancy, in fact it is a matter of common observation that the health in many women vastly improves during this period. Occasionally, and more especially in those cases where suitable nourishment is not available, anæmia supervenes without grave cause.

CLINICAL MANIFESTATIONS.

The complication of anæmia presents its usual indications, only these are more marked, especially œdema, which in some cases may be general and is particularly marked on the legs and vulva. Anæmia predisposes to thrombosis, and, therefore, "white leg" and pulmonary embolism both occur with greater frequency in these patients.

DIAGNOSIS.

It is important to distinguish simple anæmia from secondary anæmia due to disease of the heart, lungs, or kidney, and since cases

have been reported where the simple anæmia has passed into that of the "pernicious" variety, a careful examination of the blood should be made.

TREATMENT.

The case having been diagnosed as one of simple anæmia, the patient should be treated on the ordinary lines for this disease. The attendant must be most careful to ensure that as little blood as possible is lost after the birth of the child, as these patients stand such a loss very badly.

A patient suffering from the secondary anæmia due to loss of blood during and after the birth of the child must be most carefully nursed and treated.

Such a patient should not be allowed to move in any way lest the exertion occasioned thereby causes syncope or dislodges a thrombus from the uterine veins, resulting in pulmonary embolism. Such a patient will require to be kept in bed for a longer period than usual, and the legs must be carefully examined on the least complaint of pain or swelling, since thrombo-phlebitis is apt to occur during the second week.

For the immediate treatment of secondary anæmia due to hæmorrhage see p. 281.

Pernicious Anæmia.

An acutely pernicious form of anæmia peculiar to pregnancy has been described. It is probably toxic in origin. Women already suffering from pernicious anæmia may become pregnant.

RESULTS.

Pregnancy accentuates the symptoms of pre-existent pernicious anæmia; abortion or premature labour are probable and the patient may die shortly after labour.

If pernicious anæmia develops during pregnancy delivery may be followed by rapid improvement. It has been suggested that syphilis is the underlying cause in this latter type of case.

DIAGNOSIS.

The disease has to be distinguished from simple anæmia and from anæmia secondary to pregnancy nephritis, chronic nephritis, carcinoma and such other causes by careful examination of the blood and exclusion of a primary focus of disease.

TREATMENT.

Where the anæmia appears to depend upon the pregnancy, this should be terminated and the patient treated with cacodylate of soda

as advised by Andebert and Dalous. Where pregnancy has supervened on pernicious anæmia, however, induction of labour or miscarriage has not had a good effect, Schauta stating that it actually hastened the fatal termination.

LEUKÆMIA.

Leukæmia as a complication of pregnancy appears in two forms, the lymphatic and the spleno-medullary.

Lymphatic Form.

The combination of the lymphatic form of leukæmia and pregnancy is a rare and very fatal one, the rapid progress of the disease being enhanced by the pregnancy, and the patient dying in a few weeks.

The increase in the colourless blood cells is not so marked as in the spleno-medullary form, and is due entirely to lymphocytes; myelocytes are absent, and nucleated red cells rare.

Spleno-medullary Form.

This variety of leukæmia is a more chronic disease, and the chance of a co-existent pregnancy is therefore greater than in the lymphatic form, and women have been known whilst suffering from spleno-medullary leukæmia to pass through more than one pregnancy successfully before succumbing to the disease.

There is likelihood of spontaneous premature delivery owing to the size of the spleen.

The patient may suffer from bleeding from the nose, stomach or bowel.

Herman stated that pregnancy undoubtedly aggravates the disease, and that after spontaneous abortion there is a likelihood of a rapidly fatal issue. If this does not occur, improvement follows as a rule.

TREATMENT.

Termination of the pregnancy is indicated while the patient's condition is still relatively good. Excessive hæmorrhage during and after delivery does not seem to occur. The size of the spleen in some cases makes continuance of the gestation to term an impossibility. The disease should be treated by X-ray applications to the spleen. Evacuation of the uterus makes this an easier matter.

Internally, arsenic and large doses of quinine should be given.

ŒDEMA.

Œdema may appear in the legs, vulva, trunk, arms or face.

CAUSE.

Pressure of the Pregnant Uterus on the Pelvic Veins.—Œdema from this cause is common in pregnancy. As a rule it merely affects the legs towards the latter end of the period of carrying.

It may, however, be much more extensive, the area of pitting extending as high as the umbilicus, while in exceptional cases the whole body is swollen.

Renal Disease.—In pregnancy albuminuria as well as in renal disease complicating pregnancy the entire body may be œdematous, or parts of it as the case may be, most commonly the legs and face. Perhaps the most marked œdema of the vulva is seen in these cases.

Heart Disease.—When the compensation has failed and back pressure ensued, the most dependent parts of the body may become œdematous.

Impaction of the Uterus or of the Infant's Head.—In some cases of incarceration of the retroverted gravid uterus the pelvic pressure is so great that œdema of the vulva will result, and the same may obtain in labour if the fœtal head becomes impacted in the pelvis.

Thrombosis of the Femoral or Brachial Veins.—On occasions the femoral vein becomes thrombosed after labour, resulting in a swollen, œdematous condition of the leg, see p. 516. It also occasionally happens that a similar condition appears in the arm. We have not met with such a condition after normal labour, but have seen it in a case of extra-uterine gestation.

No Discoverable Cause.—We have met with cases in which there was marked œdema of the face, and great œdema of the lower limbs without any definite cause.

A very careful examination failed to detect any heart or other visceral disease, and a minute analysis of the urine failed to prove that it was otherwise than normal. In one of these cases eclampsia supervened, and the patient died. The other went to term without any further complications and a healthy child was born.

Such œdema may be due to an excess of the hydræmia normal to pregnancy.

DIAGNOSIS.

A systematic examination of the patient and her urine should in nearly every case disclose the cause of the œdema.

TREATMENT.

The treatment will be found under the respective headings of the causes. When the œdema is very marked, the induction of labour may be necessitated. Temporary relief may be obtained by inserting Southey's tubes in the legs.

If the swelling of the vulva is so extreme as to prevent access to the vagina, or to threaten to hinder the birth of the child, multiple incisions should be employed.

SUDDEN OR RAPID DEATH IN PREGNANCY AND LABOUR.

Pregnancy.

A pregnant woman may die suddenly of causes unconnected with her pregnancy, or the pregnancy itself may be responsible for the fatality. Very exceptionally no lesion may be apparent. The same event occurs sometimes in the lower animals.

The sudden death may be due to disease of the heart or lungs, to cerebral hæmorrhage or embolism, or to any other cause of sudden death occurring apart from pregnancy.

Death due to pregnancy may result from a pulmonary embolism, torsion of the uterus, intra-peritoneal hæmorrhage from a ruptured ectopic gestation, or accidental hæmorrhage.

In advanced cardiac or pulmonary disease, the pregnancy may act as the determining cause of sudden or rapid death.

LABOUR.

Where sudden or rapid death has occurred during labour, the following conditions have been found on *post-mortem* examination: Hæmorrhage from an intestinal ulcer or from a ruptured uterus; embolism of the pulmonary artery; air embolism, syncope from cardiac disease; rupture of an hepatic abscess; peri-cardial effusion; ruptured aneurysm of the aorta or splenic artery; rupture of œsophageal varices due to cirrhosis of the liver; œdema of the lungs; pleural effusion, pleural adhesions; cerebral hæmorrhage, embolism, abscess or tumour; and shock from a prolonged or difficult labour. As in pregnancy, death sometimes occurs without any definite reason being discovered at the autopsy.

TREATMENT.

If the child be viable and permission could be obtained, immediate Cæsarean section should be performed or the child delivered quickly and forcibly through the vagina.

SUDDEN OR RAPID DEATH FOLLOWING DELIVERY.

The conditions already mentioned in the preceding paragraphs may also give rise to sudden or rapid death after delivery. In this connection we may specially mention the complication of shock ensuing directly after labour, due apparently to the emptying of the uterus and unconnected with any condition likely to produce such an event.

Such cases are very rare, but at times terminate in the death of the patient. We have met three such. In all of them forceps had been used; in two, to terminate a labour which had lasted rather longer than usual because the pains were rather weak, and in one in which labour had been delayed by a contraction ring, but in which the patient was not exhausted, and the uterus above the ring was contracting and relaxing normally. In each case the uterine cavity was very carefully examined with the hand and was found to be unruptured, and in one case the perineum was ruptured.

In the case associated with the contraction ring, some difficulty was experienced in passing the hand into the uterus owing to the contraction ring which was still present.

In none of these cases was there any abnormal hæmorrhage; in all the urine was normal and the heart on auscultation appeared to be so, whilst all the patients had passed through a normal pregnancy.

One patient recovered after remaining for some hours in extreme peril; the remaining two died, on one of these a *post-mortem* examination was obtained, but failed to reveal any cause for the death.

The pulse is very rapid and feeble, the patient feels cold and sweats, whilst the respiration is of the type associated with cardiac failure. In one of the fatal cases the patient, during the six hours she lived, had several short attacks of excitement associated with struggling and a sensation of choking, after which she again subsided into a collapsed condition.

TREATMENT.

If the cause of the sudden collapse can be diagnosed the treatment proper for that condition must be carried out. For general measures the foot of the bed should be well raised, the body wrapped in hot blankets, and hot-water bottles applied. Hot brandy and water should be given by the mouth or rectum. Strychnine and ether, pituitary extract and saline solution should be injected, and if it is available, oxygen should be inhaled.

CHAPTER IX.

Diseases of the Respiratory Tract.

The subjects of lobar pneumonia and pulmonary tuberculosis are separately dealt with on pp. 144 and 151.

ACUTE BRONCHITIS AND BRONCHO-PNEUMONIA.

Acute bronchitis or broncho-pneumonia is an uncommon complication of pregnancy, labour, or the puerperium.

In pregnancy abortion is likely to be produced if the patient is cyanosed.

In labour it is a serious complication, especially in elderly patients with emphysema and cardiac degeneration. In such sudden death may occur while the delivery is in progress, or the patient may sink some hours later of cardiac exhaustion.

TREATMENT.

In pregnancy, these conditions are to be treated on the usual lines; oxygen being particularly indicated, if there is cyanosis.

In labour the chief difficulty that besets the obstetrician is the patient's inability to lie down.

She should be propped up during the first stage, and in the second should be brought to the edge of the bed in that posture, or confined throughout in a high-backed chair.

Inhalation anæsthesia is contra-indicated, so that if artificial delivery is called for the practitioner must either operate without an anæsthetic or employ spinal anæsthesia.

If there is great cyanosis a degree of post-partum hæmorrhage is not harmful, for it relieves the right side of the heart.

CHRONIC BRONCHITIS.

The statements made concerning acute bronchitis apply to the chronic variety.

Where there is marked emphysema and cardiac debility, the enlargement of the abdomen in the latter months may rapidly increase the gravity of the symptoms.

TREATMENT.

In such a case the induction of premature labour is the right course, see Chapter XXXII.

PLEURISY.

Pleural effusion during pregnancy is serious in proportion to the extent and character of the effusion and its cause.

In labour it is a very grave complication, because of the dyspnœa induced by the efforts of the patient.

Sudden death is liable to occur or death a few hours after delivery from œdema of the opposite lung.

TREATMENT.

Pleurisy during pregnancy must be treated on the ordinary lines. In labour a serous effusion should be tapped to relieve the dyspnœa, and delivery should be assisted by forceps. Chloroform has not the drawbacks that it has in bronchitis and pneumonia, but if it be deemed inadvisable to employ it, spinal anæsthesia might be used.

An empyema must be treated by resection of the ribs and drainage. The operation, if found necessary during labour, should be carried out before the second stage when possible, and the child subsequently delivered by forceps. The greatest care, of course, must be taken not to infect the uterus.

When the head is already in the vagina, the labour had better be first completed under anæsthesia if necessary, and the pleura drained afterwards.

ASTHMA.

Asthma is chiefly serious because of the emphysema and cardiac degeneration and bronchitis so often associated with it. The acute paroxysms appear to be held in abeyance during pregnancy as a rule; but, on the contrary, they may appear only during pregnancy.

Where the stage of chronic asthmatic bronchitis has been reached, the later months of gestation and particularly the period of labour involve considerable embarrassment to the heart and lungs.

TREATMENT.

In these cases the same treatment described under the heading of Chronic Bronchitis is proper.

EMPHYSEMA.

Women the subjects of emphysema are apt to become embarrassed in their breathing during pregnancy and labour. In some cases when the disease is advanced it may be necessary to induce labour or abortion to relieve the patient, or because of the insufficient aeration of the blood nature may anticipate such a procedure.

TREATMENT.

The treatment is similar to that of chronic bronchitis.

DYSPNŒA.

Breathlessness may be a symptom of the various diseases just enumerated; it may be due to the pressure of a normal uterus, to that of an abnormally enlarged uterus from hydramnios, twins or monsters, or to that of a fibroid or ovarian tumour. It may also be due to phthisis, pneumonia, anæmia, cardiac disease, renal disease and pulmonary embolism.

In the later months of pregnancy a certain degree of dyspnœa is normal, and is due to the size of the uterus. In the early months it should be viewed with suspicion, since it frequently is an indication of cardiac or renal disease.

NERVOUS COUGH AND LARYNGEAL SPASM.

Some women when pregnant suffer from attacks of coughing for which no cause can be found, and which cease only when the uterus has emptied itself.

More serious cases are those of laryngeal spasm, in which the attack commences with a tickling in the larynx, followed by a dry irritable cough, which, in its turn, is succeeded by respiratory dyspnœa and loud stridor. This complication has lasted for a month after labour.

Laryngoscopic examination has failed to reveal the cause of the cough or spasm, and in the reported cases hysteria and epilepsy has been excluded.

PULMONARY EMBOLISM.

Clot Embolism.

CAUSE.

This tragic disaster usually arises from detachment of a clot in one of the pelvic veins; occasionally it occurs as a sequence to thrombosis of one of the veins of the leg. In nearly all the cases the occurrence takes place somewhere between the tenth and twentieth day after delivery. In most of them there have been no previous symptoms.

The embolus as a rule comes from one of the venous sinuses of the uterus or from one of the large veins of the broad ligament, and in the majority of cases the thrombus of which it formed a part does not appear to have been formed as a result of acute phlebitis, but rather as an extension from the natural clotting that occurs at the placental site after delivery. In some cases a latent subacute

thrombosis of the broad ligament veins is probably responsible for the disaster, and in such slight fever has been present at some period of the puerperium.

It is quite rare for the clot formed in ilio-femoral thrombosis ("white leg"), or as a result of phlebitis of the superficial veins of the leg, to become separated. In short, it would appear that the physiologically formed thrombus is much more easily detached than that due to acute inflammation of the vein wall.

SYMPTOMS AND SIGNS.

There are two types of case. In each the onset is sudden.

In the first the patient is stricken down with a sense of terrible oppression in the chest, the face is lividly pale, the pulse almost imperceptible, and the respirations shallow and gasping. The heart ceases to beat in a few minutes.

Probably in these cases the size of the embolus is such that the obstruction leads to instantaneous failure of the heart.

In the second type the patient is seized with distressing dyspnœa and rapidly becomes deeply cyanosed, and in bad cases unconscious and convulsed. The respirations stop before the heart, which may go on beating strongly for a considerable time.

This class of case is less uniformly fatal than that just described, probably because the embolus is smaller and the outflow from the right side of the heart not so entirely obstructed.

In a small proportion, after a period of acute distress, the patient gradually recovers. Pleural pain and bloody expectoration then supervene as a rule, and examination discloses an area of pulmonary consolidation marking the site of the infarct.

DIAGNOSIS.

Sudden heart failure due to cardiac disease, extensive cerebral hæmorrhage, and cerebral embolism may all produce sudden collapse in a puerperal woman.

Sudden and marked cyanosis and great dyspnœa are, however, peculiar to pulmonary embolism.

In the "white" type, the diagnosis is more difficult.

Michaelis has noted a subfebrile temperature for some days prior to the embolism in many cases, and we have confirmed this.

TREATMENT.

In the more severe "white" type little can be done. Stimulants, if at hand, should be given, and ether and strychnine should be injected subcutaneously. Practically all these cases die.

In the "blue" type the same measures must be employed. In addition oxygen should be administered, and if the pulse be plainly perceptible venesection is indicated. Artificial respiration should be at once resorted to, and persisted in so long as the heart continues to beat.

Air Embolism.

This condition has lately been described by Campbell.

CAUSE.

It is due to air finding its way into the uterine sinuses during the third stage of labour.

Campbell believes the condition to be explained by the maintenance of the semi-prone position after delivery of the child.

This position induces a flow of air into the uterine cavity, which is more marked if the patient has been anæsthetised and her abdominal wall relaxed.

While the placenta remains attached nothing happens, but so soon as it gets displaced into the lower segment and cervix there is a danger of its occluding the exit of the uterus, with the result that the next uterine contraction, unable to expel the air downwards, forces it into the veins of the placental site.

SYMPTOMS AND SIGNS.

These are very similar to those of embolism by blood clot, namely, distress, dyspnœa, cyanosis, and convulsions, but as the air embolus becomes rapidly broken up they are more transient in character. Further, they recur with each contraction of the uterus.

TREATMENT.

Dorsal decubitus should be adopted in the third stage of labour.

If the symptoms described supervene, the placenta should at once be manually extracted. On no account should it be expressed from above, nor the uterus manipulated in that way, or another embolism may be caused.

The placenta having been removed, the uterus should be irrigated with a hot antiseptic solution.

The measures to be used for the revival of the patient are the same as those detailed under the head of Clot Embolism.

CHAPTER X.

The Acute Infectious Fevers.

The mortality among pregnant women attacked by one of the acute infectious fevers is much greater than in those who are not pregnant, for not only may the disease assume a more serious type, but abortion or premature labour, due to the high temperature or to the particular agent of the disease, whatever it is, destroying the child, is likely to occur in half the cases, and adds an additional risk to the chances of recovery.

SCARLET FEVER.

Scarlet fever is rare in pregnancy, and it seems probable that a pregnant woman is less likely to fall a victim to it than other women.

It is stated by Olshausen that the period of incubation of scarlet fever in a pregnant woman may be very prolonged, the disease declaring itself only on the completion of labour, weeks perhaps after the time of infection. Ballantyne notes that twenty cases have been reported where the disease was communicated to the child, as evidenced by the appearance of the rash on the child and desquamation.

If, however, the mother does become infected, the disease is likely to be of a much more serious type, and the mortality is higher than in the non-pregnant. In addition, the period of pregnancy when the disease declares itself has some bearing on the prognosis, since it is less grave in the early months and when abortion is not a further complication. If the fever appears at the end of pregnancy, the condition of the patient is apt to be serious, the fever being very high and the rash very marked. The maternal mortality under such circumstances is stated to be as high as 75 per cent.

MEASLES.

Although a pregnant woman is just as likely to have measles as one not pregnant, the danger to herself is very slight; to the child, however, it is considerable, as the uterus is likely to empty itself when the rash appears. If, however, the child lives through the eruption stage, it will probably survive. If the measles is

complicated with broncho-pneumonia, the lessened abdominal space due to the enlarged uterus will be a serious hindrance to respiration. Occasionally the disease is hæmorrhagic in type, when the prognosis will be very grave. The disease can be transmitted to the child, there being several cases on record where the child has been born covered with the rash. If delivery takes place during an attack, there appears to be an increased danger of post-partum hæmorrhage.

WHOOPING COUGH.

The prognosis of whooping cough during pregnancy both for the mother and child is good. Owing to the size of the uterus, the attacks of coughing are apt to be even more distressing than usual, and occasionally the repeated shock to the uterus due to the coughing induces a miscarriage. The disease has been noted as present at birth.

CHICKEN POX.

Varicella in a pregnant woman runs a course similar to that which it does in one not pregnant, and is not more dangerous. The child does not appear to incur any risk, but may be born covered with the rash if the disease appears just before labour.

MUMPS.

An attack of parotitis has no particular influence on the pregnant woman or on the child. A few cases have been recorded of fœtal parotitis.

DIPHTHERIA.

When diphtheria attacks a pregnant woman, it is likely to be very virulent, and appears to affect the larynx more than other parts of the respiratory track. In the absence of early and efficient treatment by anti-toxin, the mortality is very high.

SMALL-POX.

There need be no fear in vaccinating a pregnant woman if it is necessary owing to the prevalence of small-pox; in fact, some authorities have claimed that it is good for the child also, owing to the fact that a certain percentage of new-born children whose mothers were vaccinated during pregnancy have not taken when vaccinated at birth; but whether this percentage is greater than usually obtains appears to be doubtful.

The prognosis for pregnant women the subjects of small-pox is

somewhat worse than those who are not pregnant. The type of disease is also more severe, the confluent and hæmorrhagic varieties being commoner and the latter very fatal. The life of the child is in grave risk, since abortion or premature labour is very common, either from the disease affecting the decidua, or the child itself becoming infected, in which case it may be born covered with pustules or the cicatrices of such. If born in the early stages of the disease, a rash may appear on the child two or three days following delivery.

CHOLERA.

The prognosis of cholera is, of course, always bad, but pregnancy does not materially increase its danger, more especially if the woman is infected early in pregnancy. The maternal mortality in the Hamburg epidemic was 57 per cent. The danger to the child is, however, very great, a large majority of the children being born prematurely, due in most cases to hæmorrhage into the uterus. This tendency to premature delivery is greater if the mother is attacked late in pregnancy, in which case also the maternal mortality is greater. The comma bacillus has been found in the fœtus.

PLAGUE.

Pregnant women are just as likely to catch the plague as the non-pregnant, but being infected, they do not appear to run any greater risk, although in most cases the pregnancy comes to an end.

MALARIA.

Malaria as a rule has but little influence on pregnancy, but if the woman has had malaria previously, the pregnant state favours another attack. The uterus will empty itself in the majority of cases if the temperature reaches 104° F. It is stated that during an acute attack of malaria, the movements of the fœtus and the intermittent contractions of the uterus are likely to become very marked. If the disease is of the *bilious remittent type*, the prognosis for the mother is grave, and the child will almost certainly perish either before the uterus empties itself or as a result of this. The malarial parasite is found in the child.

TREATMENT.

Treatment by large doses of quinine is indicated, and, contrary to what one would expect, it quiets the uterine contractions instead of, as in non-malarial pregnant women, exciting them.

TYPHOID FEVER.

A woman may become infected during her pregnancy, but this condition does not seem to influence the character, severity, or prognosis of the disease in any way. On the other hand, in about 70 per cent. of the cases, either miscarriage or premature labour results. The particular time the uterus empties itself depends on the period of gestation. Thus, if the woman is nearing term, the premature labour will as a rule take place in the first week or so; if the attack of typhoid supervenes before quickening, the miscarriage may not occur till the third or fourth week of the attack. The disease has no effect on labour, neither has labour any effect on the disease, be it ever so bad; in fact, the patient is stated to be relieved by its occurrence, and the puerperium, so far as the uterus is concerned, continues normally afterwards. The typhoid bacillus can be found in the child, its serum may give a positive Widal reaction, and rarely the Peyer's patches are found ulcerated. It is difficult to see the rash on the woman's abdomen on account of the striæ gravidarum.

TREATMENT.

The temperature must be kept below 103° F. if possible, as when it rises above this, the child is almost certain to perish. From the few children that have been examined for the typhoid bacillus, it seems possible that this organism does not infect the child till the third week of the mother's illness, and from this it has been deduced that if the child is viable, it would be best in its interests to induce labour before the end of the third week, in the hopes of getting a living child.

INFLUENZA.

Upon the type of influenza will depend the danger to pregnancy. In mild cases it is not increased, but the child may suffer if the mother is long in recovering her health and strength after an attack, and children born under this condition have been noted to be weak and often die early. Congenital influenza has been noted by Ballantyne. In severe cases the uterus is likely to empty itself prematurely, and this especially in the pneumonic type. From observations made in Switzerland, where the number of births was 5,000 less than the average of the four years previous to an epidemic of influenza, it has been argued that this disease may be a cause of sterility.

TREATMENT.

The treatment will be conducted on the same lines as if the woman was not pregnant.

LOBAR PNEUMONIA.

The effect of this disease on the pregnant woman depends upon the period of gestation. In the early months of pregnancy the danger to the mother is not appreciably increased, but miscarriage occurs in about 33 per cent. of the cases. In the later months of pregnancy, pneumonia is a most serious disease for the mother, the maternal mortality being close upon 50 per cent., and premature labour likely to take place in 66 per cent.

Interference with the respiration by the pregnancy is responsible in part for this increased maternal mortality.

TREATMENT.

Labour should never be induced, since the worse thing that can happen to the woman is for miscarriage or premature labour to supervene.

When labour comes on, the patient must be assisted with forceps as early as possible. If the cervix does not dilate quickly, it should be dilated artificially or version may be performed. The heart must be strengthened with digitalis and strychnine. If there is much dyspnœa and cyanosis, a degree of post-partum hæmorrhage may help matters.

CEREBROSPINAL FEVER.

Although the infectious epidemic disease known as cerebrospinal or spotted fever attacks children in a large percentage of cases, still it occurs among adults, especially younger ones, and so it happens that occasionally pregnant women become affected.

The prognosis does not appear to be materially altered because the patient is pregnant, but as in other acute toxæmic conditions miscarriage or premature labour is probable.

SIGNS.

With the signs mentioned as accompanying meningitis, p. 97, the patients complain in addition of severe pain in the back and limbs, with spasms of a tonic or clonic nature, the back being held very rigidly and the head being markedly retracted. Herpes is very constant, and small hæmorrhagic patches may be found covering the trunk, from which the term spotted fever has its origin.

DIAGNOSIS.

An examination of the fluid withdrawn by lumbar puncture will disclose the meningococcus intracellularis.

TREATMENT.

This should be on the lines laid down in text-books of medicine.

CHAPTER XI.

Certain Specific Infections.

GONORRHŒA.

The effects of this disease as a complication of pregnancy will depend upon whether it was acquired before the pregnancy, whether its acquisition coincided with the fertilisation of the ovum, whether infection took place in the three months succeeding impregnation, or whether the disease was acquired subsequent to this period.

Infection before Pregnancy.

The presence of gonorrhœal infection renders pregnancy unlikely. When the disease does not extend higher than the cervix, grafting of the oosperm is possible, but when the endometrium is affected, such an event is very improbable. Supposing, however, it should occur, an abortion in the early weeks may be expected.

Coincident Infection and Fertilisation.

When the disease is acquired coincidently with the fertilisation, abortion is less likely. Probably the fact of pregnancy occurring at all under such circumstances indicates that the infection has not extended above the cervix.

Infection during the First Three Months of Pregnancy.

When gonorrhœa attacks a woman already pregnant, its effects on the mother are very marked, the resulting inflammation of the vagina and vulva being of a very acute type. Its effects on the ovum vary somewhat according to the period of gestation. In the first three months a uterine cavity still exists, so that extension of the disease to the decidua or even to the Fallopian tubes is possible. The resulting acute inflammation of the decidua will most probably produce abortion.

Infection during the Last Six Months of Pregnancy.

The uterine cavity being now obliterated, an extension of the disease to the decidua or Fallopian tubes is not possible. For this reason gonorrhœa acquired during this period does not as a rule affect the pregnancy.

There are, however, cases recorded in which infection of the eyes

of the child occurred *in utero*. In most of these the membranes had ruptured some time before the onset of labour.

Effects of Gonorrhœa on the Puerperium.

Mother.—If the disease is not cured before the birth of the child, the mother incurs the risk of a puerperal infection of the recently delivered uterus by the gonococcus. As a rule, cases of puerperal fever due to this organism are not very severe; but occasionally the organism appears to acquire a special virulence and the result is fatal.

Child.—The child's eyes are very likely to become infected during or after delivery, see p. 745.

DIAGNOSIS.

The only absolute criterion of gonorrhœa is the presence of the gonococcus. Since this organism presents some difficulty as regards culture, and, moreover, is resembled in some respects by other micro-organisms, the practitioner will be wise if he places the burden of proof on the wider shoulders of a bacteriologist. In some cases, of course, the diagnosis of the case is supplied by the husband; but in the absence of such, the medical man should be careful to keep his suspicions or his knowledge strictly to himself.

TREATMENT.

During Pregnancy.—Gonorrhœa during pregnancy should be vigorously treated both on account of the mother and child.

Where the patient can be kept in bed and afford the services of a nurse, the best course is to frequently irrigate the vagina with a solution of a weak antiseptic, such as boracic acid. This may be done every two hours during the day, the quantity used each time being large.

Once in the day the whole vagina should be swabbed out with a solution of one of the organic silver salts, such as protargol, 10 per cent.

For the vagina to be treated satisfactorily the patient must be placed across the bed in the lithotomy position and a Sims' speculum introduced.

Treatment of the cervix is important because the infection harbours here and reinfects the vagina. Manipulation of the cervix, of course, tends to provoke uterine contraction, but to a much less extent than might be thought. We have successfully applied silver solutions to the cervical canal every other day for several weeks without starting expulsive efforts, and we recommend

this practice, especially in the later months, when it is important to get the disease cured before the onset of labour.

The urethra should also be daily swabbed with the silver solution, since it is another harbourage for the organism.

Where gonorrhœa can be treated on these vigorous lines, a rapid cure is in most cases effected. So soon as the purulent discharge and the redness and swelling subside, a weekly application of protargol, with douching three times a day, should be substituted as long as any discharge remains. The bacteriological content of the vagina should be examined periodically as an indication of the necessity or not for further treatment. Treatment by a gonococcal vaccine is well worth a trial in such cases.

During Labour.—Mother.—If the practitioner discovers a discharge for the first time during labour, he should give a vaginal douche of 1 in 2,000 biniodide of mercury before the membranes rupture, again on rupture of the membranes, and again after the birth of the child.

Child.—Directly the child's head is born the precautions described on p. 745 should be taken.

During the Puerperium.—Mother.—The mother should be douched at least three times daily with 1 in 4,000 biniodide of mercury.

Child.—The child's eyes should be carefully watched, and at the first indication of the disease it should be vigorously dealt with, see p. 745.

SYPHILIS.

The Mother.

A syphilitic woman may become pregnant, syphilis may be acquired during pregnancy, or pregnancy and syphilis may be acquired simultaneously.

There are two possible ways in which the third alternative may happen. The first, which is the commonest and concerning which there is no dispute, is by direct infection of the vulva or other part of the genital tract during the fertile coitus. The second, which is denied by many authorities, is by the medium of an infected spermatozoon ("conceptional syphilis"). In the first case the disease runs its usual course. The second has been held to explain those instances in which a woman develops secondary symptoms during pregnancy without evidence of a primary sore, and also the known immunity to infection from her syphilitic child that obtains in the mother, even though she herself has had no signs of the disease.

It must, however, be remembered that the presence of a primary

lesion is much more likely to be overlooked in a woman than in a man, and some cases of alleged "conceptional syphilis" may really belong to the group that arises from direct infection, the primary site having been passed unnoticed.

It is certain that the apparently healthy mothers of syphilitic infants react positively to Wasserman's test.

Pregnancy tends to accentuate the lesions of syphilis, particularly those about the vulva, because of the vascular congestion which it produces there.

The Child.

The ovum becomes infected with syphilis either by transudation through the placenta or by the medium of the infected spermatozoon. The latter occurrence is extremely doubtful.

Its effect on the fœtus varies. When acquired by the mother before conception, or in the earlier months of gestation, abortion is very probable; but the tendency to premature expulsion of the ovum diminishes with infection in the later months, and it becomes increasingly likely that the child, though syphilised, will be born alive at term.

In subsequent pregnancies the ovum has, as a rule, an increasingly better chance of surviving, as the virus seems to wear itself out by degrees. Occasionally, out of several children, one or more seem to escape infection altogether. Children surviving till term will probably be born apparently healthy, but syphilitic manifestations appear within a month or two of birth in the majority of them. Of these, syphilitic rhinitis, popularly known as "the snuffles," is the first to appear.

The child wastes rapidly, its skin becomes yellow, and various rashes occur, that most commonly seen consisting of scaly reddish-brown patches, especially affecting the buttocks.

The hair falls out and the child presents a wizened, aged appearance that is very characteristic.

Persistent swellings (Charcot's nodes) appear on the vault bones of the skull and on the long bones, whilst necrosis of the nasal and palate bones often occurs. These children untreated pass into a condition of extreme marasmus with vomiting and diarrhœa, which often proves fatal.

Occasionally the child is born with syphilitic manifestations. Of these a bullous eruption of the skin (syphilitic pemphigus), great thickening of the epiphysial ends of the long bones and a massive enlargement of the liver and spleen are the most common, and in many of these cases the child is stillborn.

The placenta may be abnormally large and solid, and of a patchy whitish colour.

It does not, however, follow that obvious lesions are present in the stillborn syphilitic child or in its placenta.

In cases of habitual intra-uterine death of the fœtus, Williamson and Holland have shown that microscopical examination may reveal the presence of the Spirochæta Pallida in the placenta and fœtal liver, though there are no obvious signs of the disease.

DIAGNOSIS.

As regards the pregnant woman, syphilis is diagnosed by the usual clinical signs and symptoms. Where doubt as to the nature of a lesion exists, the exudate from its surface should be examined for the presence of spirochætes. In the primary stage of acquired syphilis, Wasserman's reaction is useless, but in the later stages it is an important diagnostic aid. For this test to be of any value it must be carried out by one skilled in such work.

Difficulty will arise in those cases in which, although the father is known to be actually syphilitic, the pregnant woman shows no signs of the disease.

Here Wasserman's reaction would be of great value in deciding whether the woman, and therefore the ovum, was infected or not.

Where abortion or stillbirth follows on probable infection, or where repeated abortions or stillbirths raise a suspicion of such infection, the fœtus and placenta should be examined for the presence of the spirochæte. In the fœtus it should specially be sought for in the liver.

TREATMENT.

The treatment of syphilis complicating pregnancy does not differ materially from that of the disease when not so associated.

Inasmuch as the vulval manifestations are apt to be extremely marked, they will require vigorous local treatment. Where ulceration and swelling of the parts is profound, a preliminary cleansing by frequently replaced antiseptic fomentations is desirable. Later, dusting powders are superior to wet preparations. Equal parts of calomel, zinc oxide and fine fuller's earth may be used, or iodoform or aristol, the latter being preferable because it has practically no odour.

Syphilis acquired before Pregnancy.—If a woman known to be syphilitic falls pregnant, treatment of the disease is imperative in the interests of the child. In cases where the mother has had no manifestations recently, but yet is known to have suffered from

the disease, examination of her blood by Wasserman's method will decide the necessity for anti-syphilitic treatment in the interests of the child.

Where the father is known to have suffered from syphilis in the past, and fears as to the unborn child exist, both parents' blood should be examined, even though the mother has never had any signs of the disease.

The finding of a positive reaction in the case of the father is far less grave than in the case of the mother, for, presuming the test to be negative in her, infection of the child is extremely unlikely unless one admits the possibility of a conceptional infection, the mother remaining immune.

Syphilis acquired with or during Pregnancy.—Syphilis acquired coincidently with or during pregnancy must be vigorously treated, and the more so the later the disease is acquired, because there is less time for therapeutic measures to be successful as regards the child.

It is not within the scope of this work to discuss the various methods of treating syphilis, but reference must be made to the use of salvarsan.

It appears to us that this drug is the more indicated because the patient is pregnant, for in such an event, cure of the disease in the mother is imperative before the child is born if the latter is to be saved from congenital syphilis.

Where syphilis is discovered at the onset of pregnancy the practitioner has nine clear months over which he may treat both the mother and the unborn child, presuming the pregnancy endures to term. In this period a vigorous mercurial course might be successful, but it is extremely doubtful. As a matter of fact, however, in a large proportion of such cases the pregnancy terminates prematurely, so that the child's life is either lost, or the infant, being born alive, is either frankly syphilitic or is liable in later life to develop congenital tertiary lesions.

We therefore think that in all cases of syphilis acquired with or during pregnancy salvarsan should be employed, and especially in those in which the disease is transmitted to the mother late in her pregnancy.

The administration of the drug by intra-venous injection in cases of pregnancy has been carried out for us by our colleague, H. MacCormac, on several occasions. In no instance was the injection followed by disturbance of the pregnancy or other ill-effects.

Sauvage collected 130 cases thus treated and found that there was no tendency to abortion.

After the use of salvarsan the blood of the mother should be subjected to Wasserman's test at intervals, and if the results be negative, the prospects of the child being born free of the disease are good in the light of our present small experience.

The Risk of Fœtal Infection.—The practitioner will sometimes be asked by married couples, one or both of whom have had syphilis, whether, in the event of pregnancy, the child is likely to be born a syphilitic. Where the husband has had the disease, but for more than two years before marriage has had no manifestations, while the wife has had no signs at all, syphilis in the child is unlikely except by the rare and questionable method of conceptional infection.

If the husband, however, has had signs within two years of marriage, the child is much more likely to be syphilitic.

If the mother has had syphilis, the liability of the child to suffer likewise is less influenced by the length of time that has elapsed between her acquirement of the disease and the pregnancy, for so long as the spirochætosis endures in her, so long does her capacity for transmitting the disease to her child remain.

In all these cases the best way of answering the question is by the application of Wasserman's test to both parties. In the event of the wife giving a positive result, the probability of her child being syphilitic amounts almost to a certainty.

If the test in the case of the wife is negative, but in the case of the husband is positive, there is a possibility of the child being syphilitic.

If the test is negative in both husband and wife, the child will, as far as present knowledge goes, be free of the disease.

Where a positive reaction is found in either husband or wife, anti-syphilitic treatment of the individual should be undertaken until the test is negative, after which pregnancy may be permitted.

If both are affected, both should be treated.

The subject of the treatment of syphilis in the child is treated on p. 755.

PULMONARY TUBERCULOSIS.

PROGNOSIS.

There is no reason to suppose that pregnancy in any way acts as a deterrent to the invasion of the tubercle bacillus; on the contrary, the facts appear to point in the other direction, since although when a phthisical woman becomes pregnant her general condition may appear to be improved for the time being, the total result of her conception is on the debit side of her health account,

a fact which often becomes unmistakable during her puerperium or the period of lactation.

The immediate effect on the child is not serious, and premature labour or abortion due to the tubercle is uncommon, and then only occurs when the mother is *in extremis*. It has been demonstrated beyond doubt that the tubercle bacillus can be transmitted to the fœtus *in utero*, but such an event is extremely rare, and as a rule even if the abortion or premature labour is directly attributable to the tuberculosis, the children are most often born without any signs of disease.

The ultimate effect on the child is, however, a much more serious matter, since it is well recognised that tuberculous parentage is an unfortunate inheritance, for the child is more likely to be a victim of the same disease, and apart from this, may not lead such a vigorous existence as one more fortunately procreated.

TREATMENT.

Pulmonary tuberculosis complicating pregnancy should be treated in precisely the same way as when the disease is not thus complicated.

The induction of abortion or of premature labour must be reserved for very special cases. Accumulated experience shows that on the termination of pregnancy the patient's health tends to rapidly depreciate.

Rarely when the disease is so advanced and the mother so distressed that it is unlikely she can live to see her child born at full term, premature labour may be induced in the interests of the child only.

The indication during labour is to shorten it as much as possible compatible with the safety of the mother and child, in order that the mother, more especially when the disease is advanced, may be saved the exhausting effects of a prolonged labour and the distressing symptoms due to her limited breathing powers. When, therefore, the cervix is sufficiently dilated, the child should be delivered with forceps.

The mother should on no account nurse her child, for not only will the extra call on her resources further depreciate her health, but also the tubercle bacillus may be excreted in her milk, to the undoing of her child.

LARYNGEAL TUBERCULOSIS.

A woman with tubercle of the larynx may very occasionally pass through pregnancy without any serious increase in the disease, but

generally the complication is a most severe one and her fate is practically hopeless, the disease becoming rapidly worse.

Laryngeal tuberculosis may first appear during pregnancy, and the dysphagia with which it is so often complicated makes matters worse by limiting the amount of nourishment the patient is willing to take.

Laryngeal phthisis, in addition to pulmonary tuberculosis, is a particularly serious complication of labour owing to the distressing breathlessness.

TREATMENT.

The treatment already indicated for pulmonary tuberculosis should be carried out. In the cases we have met with labour had to be induced.

For the distressing cough associated with tubercle of the larynx, a linctus composed of liquoris morphinæ acetatis, 8 min., chloric æther, 3 min., succi limonis, 15 min., and mucilaginis acaciæ to 60 min., will be found useful; or one of tincture opii, 5 min., acidi sulphurici diluti, 5 min., and linctus simplicis to 60 min. The inhalation of 20 to 30 min. of a mixture of 2 parts of spirits of chloroform and 1 part of creasote will often give relief.

For the dysphagia a solution of cocain, 10 gr., and boracic acid, 5 gr., in an ounce of glycerine and water may be applied locally.

TUBERCULOSIS AND MARRIAGE.

With reference to this subject, Osler makes the following remarks which so aptly sum up the questions involved that we cannot do better than quote the whole passage[1]:—

"Under the subject of prognosis comes the question of the marriage of persons who have had tuberculosis or in whose family the disease prevails. The following brief statements may be made with reference to it:

"(*a*) Subjects with healed lymphatic or bone tuberculosis marry with personal impunity and beget healthy children. It is undeniable, however, that in such families scrofula, caries of the bone, arthritis, cerebral and pulmonary tuberculosis are more common. Which is it, 'heredité de graine ou heredité de terrain,' as the French have it, the seed or the soil, or both? We cannot yet say. The risks, however, are such as may properly be taken.

"(*b*) The question of marriage of a person who has arrested or cured lung tuberculosis is more difficult so decide. In a male, the

[1] "The Principles and Practice of Medicine," 8th edition, 1912, p. 222.

personal risk is not so great; and when the health and strength are good, the external environment favourable, and the family history not extremely bad the experiment, for it is such, is often successful, and many healthy and happy families are begotten under these circumstances. In women the question is complicated with that of childbearing, which increases the risks enormously. With a localised lesion, absence of hereditary taint, good physique, and favourable environment, marriage might be permitted. When tuberculosis has existed, however, in a girl whose family history is bad, whose chest expansion is slight, and whose physique is below the standard, the physician should, if possible, place his veto upon marriage.

"(c) With existing disease, fever, bacilli, etc., marriage should be prohibited. Pregnancy usually hastens the process, though it may be held in abeyance. After parturition the disease advances rapidly. There is much truth, indeed, in the remark of Dubois, 'If a woman threatened with phthisis marries, she may bear the first accouchement well; a second, with difficulty; a third, never.' Conception may occur in an advanced stage of the disease."

ACTINOMYCOSIS.

RESULT.

Infection by the ray-fungus has no appreciable effect on pregnancy, although pregnancy is said to predispose to infection.

If a subject of actinomycosis becomes pregnant, the progress of the lesion is held in check during this period, the tendency to the destruction of tissues being much diminished owing to the increased blood supply. With the advent of the puerperium, however, the aspect of affairs entirely changes. Thus there is a sudden and well-marked recrudescence of the disease, the lesion breaking down and rapidly increasing in extent.

The disease may have no effect on the child, or it may be below the normal weight and weakly at birth.

TREATMENT.

During pregnancy the proper treatment is, if possible, to thoroughly scrape the local lesion, afterwards well swabbing the part with a solution of iodine. Iodide of potassium should be administered internally.

CHAPTER XII.

Disorders of the Vulva and Vagina.

PRURITUS VULVÆ.

Pregnancy is sometimes associated with intense itching of the vulva.

CAUSE.

The urine should be examined to exclude glycosuria. The appearance of the vulva should next be considered. The disease known as leukoplakic vulvitis, which produces extreme pruritus, is characterised by a whitish thickening of the vulval surface, especially affecting the labia minora and inner surfaces of the labia majora, and later by the appearance of cracks and fissures. There is a liability for this disease to pass into carcinoma. Pruritus may also be due to vaginal discharge. If naked-eye changes are not observable, the symptom is to be ascribed to the congestion of pregnancy or functional causes.

TREATMENT.

For the treatment of glycosuria see p. 71. The itching of leukoplakic vulvitis is relieved by the application of "Zymocide." The fluid should be diluted with four parts of water. "Resinol" ointment is another good anti-pruritic. The application of X-rays or radium should be tried if these measures fail.

If the pruritus is due to a vaginal discharge, appropriate vaginal douches must be ordered, and the patient may be directed to smear the vulva with vaseline to which morphia, cocain, methol or icthyol may be added. A very useful application in some cases is a lotion composed of a drachm of chloroform to an ounce of almond oil. Calamine ointment containing 5 per cent. of cocain and adrenalin 1 in 5,000 is also excellent.

Functional pruritus is to be treated in the same manner locally while the internal administration of bromides and icthyol is indicated.

SOFT SORES ON THE VULVA.

The treatment of soft sores during pregnancy does not differ from that of cases not so complicated. In the acute stage warm boracic

fomentations help to clean the ulcers. Later on, the application of antiseptic lotions and dusting powders is indicated. The sores having been well bathed in a 1 in 1,000 solution of mercury biniodide, should be dried and powdered with "aristol" (biniodide of thymol).

A piece of lint spread with boracic acid ointment should then be placed between the labia, and further supported by a diaper.

Glandular swellings require fomentation and incision. The patient should, if possible, be kept in bed. The discharge from the ulcers should be examined, lest it contain the spirochæte of syphilis.

VULVAL WARTS.

Venereal warts grow at a great rate in a pregnant woman. They should be excised after a preliminary cleansing by repeated antiseptic fomentations and irrigation. The bleeding is always free during the operation and should be stopped by pressure, heat, or mattress suture.

BARTHOLIN'S CYST.

A cyst of Bartholin's gland does not give rise to any obstruction in labour, but is apt to either rupture in the process or to inflame afterwards.

TREATMENT.

It is best to remove the cyst if it is discovered early in pregnancy.

In the later months, however, it should be left alone. At the onset of labour it would diminish the chance of subsequent suppuration if the contents of the cyst were aspirated with a fine needle attached to a syringe. The puncture should be made through the skin surface with antiseptic precautions. The cyst will, of course, refill again in a week or two, and it should then be excised so soon as the puerperium is over.

BARTHOLIN'S ABSCESS.

CAUSE.

A Bartholin's abscess is so commonly due to a gonococcal infection that its appearance during pregnancy calls for energetic treatment.

RESULT.

If it is not efficiently treated before labour, the patient runs a great risk of auto-infection, and the child's eyes may suffer.

TREATMENT.

The abscess should be opened, scraped, swabbed with pure carbolic and then plugged, and afterwards it should be dressed daily. For the accompanying vaginal discharge appropriate treatment should be carried out, see p. 146.

GANGRENE OF THE LABIA.

The labia majora may be injured during pregnancy, become infected and then gangrenous. Under such conditions the application of hot fomentations after a thorough scraping and swabbing with a strong antiseptic has arrested the disease, and the patient has gone to term without further trouble.

CANCER OF THE VULVA.

Cancer of the vulva discovered during pregnancy must be immediately removed unless too far advanced.

TREATMENT.

If the growth is at all extensive, the entire vulva will have to be excised. This operation leaves as a rule a narrowed condition of the vaginal inlet, and, moreover, is apt to be followed by a good deal of suppuration.

For this reason, if the pregnancy is early, it would be well to terminate it either beforehand or under the same anæsthesia as that required for the operation. In the latter proceeding the growth should be carefully excluded during the emptying of the uterus, lest implantation of cells or organisms should result.

In later pregnancy the best course is immediately to extirpate the growth, and then at term to deliver by Cæsarean section.

If the vulval disease is beyond the reach of surgery, delivery by Cæsarean section just before term is indicated.

VAGINAL CYSTS.

Vaginal cysts are sometimes discovered during pregnancy.

They are often situated in the anterior vaginal wall, and are then probably of Wolffian origin.

Unless the cyst has attained a large size, it will cause no obstruction to delivery, and as its removal may be a somewhat troublesome matter, it is best as a rule to leave it alone. When small and at the lower end of the vagina, we have removed them during pregnancy without any trouble.

At the onset of labour the cyst might be aspirated with a fine

needle under strict antiseptic precautions. This proceeding would lessen the chance of suppuration arising from compression and bruising during the labour. If the cyst fills up again, it should be removed.

CANCER OF THE VAGINA.

Cancer of the vagina is a very rare complication of pregnancy.

If detected sufficiently early, it should be extirpated. A growth situated in the upper half of the vagina is best dealt with by Wertheim's radical operation, such as is employed for carcinoma of the cervix.

A growth in the lower half must be extirpated from below, together with the whole vagina and uterus, by Schauta's operation.

If the child is viable and the growth is in the upper half of the canal, Wertheim's operation may be preceded by Cæsarean section.

If the growth be below this, the best course would be a combined operation, the uterus, either opened or unopened, being first removed from above and the peritoneum closed over the open end of the vagina, which should then be dissected out from below.

If the cancer be too advanced for removal, Cæsarean hysterectomy should be performed.

CHAPTER XIII.

Displacements of the Uterus, Cervix, and Vaginal Wall.

PROLAPSE OF THE PREGNANT UTERUS.

CAUSE.

Procidentia of the uterus can only occur in the first three months of gestation, because after this period the organ becomes too large to pass through the pelvis. In a large majority of cases a previous prolapse has been present.

SYMPTOMS.

Sensations of weight and bearing down are common in early pregnancy owing to the increased size of the uterus. Where a woman already has a tendency to prolapse, the supervention of pregnancy rapidly accentuates the symptoms. So much is this the case that patients of childbearing age who complain of "falling of the womb" should always be questioned as to the regularity of the menses.

As pregnancy advances the uterus usually rises out of the pelvis, and the symptoms are relieved during the rest of the period of gestation. In total prolapse of the pregnant uterus, however, the protruded mass is very large, and much pain and discomfort is occasioned owing to its being gripped by the levator ani. Occasionally reduction may be impossible. The uterus empties itself in such cases if untreated.

DIAGNOSIS.

A prolapse of the second degree with the cervix appearing at or through the vulva has to be distinguished from a hypertrophied cervix, which condition will be dealt with next (Fig. 12).

TREATMENT.

The bladder must first be emptied, the misplacement often resulting in a certain amount of residual urine and occasionally acute retention.

The uterus must be pushed back into position and retained there by a pessary. A rubber ring is generally the most useful, but a cup-and-stem pessary may be necessary in some cases.

The instrument should be taken out so soon as the increasing size of the uterus makes prolapse impossible. No operation is, of course, to be entertained. In cases of procidentia, where the prolapsed mass is very large and congested, it may even be impossible to reduce the organ, in which case the uterus must first be emptied under an anæsthetic, and then its reduction will be easy.

The patient should be kept in bed for some days after the uterus is reduced, particularly if the cervix is ulcerated. The maintenance

Fig. 12.—Prolapse of the Pregnant Uterus.

of dorsal decubitus prevents prolapse and allows of the stretched pelvic floor recovering itself in some measure.

PROLAPSE OF THE CERVIX.

CAUSE.

The condition may be a congenital one, but is usually the result of previous hypertrophic inflammation. It is met with in pregnancy more commonly than prolapse of the whole uterus.

SIGNS.

The vaginal portion of the cervix is hypertrophied and elongated, so that it protrudes at the vulva, although the vaginal vault is at or nearly at its normal level and the fundus of the uterus at its proper height (Fig. 13).

The cervix being gripped by the vulva may become very congested and œdematous, and it may become ulcerated by friction.

The deformity is not remedied by the advancement of pregnancy as is the case with prolapse of the uterus. Such a cervix may be a

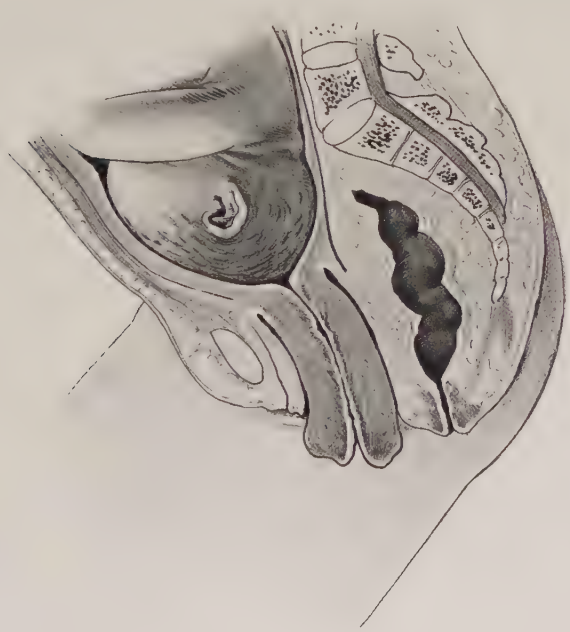


Fig. 13.—Hypertrophic Elongation of the Vaginal Portion of the Cervix.

cause of delay in labour, but, as a rule, no great degree of obstruction is occasioned.

DIAGNOSIS.

The condition must be diagnosed from a prolapse of the second degree with supra-vaginal stretching of the cervix.

TREATMENT.

These cases are very difficult to treat. Obviously no pessary has

any effect on the deformity, while any operation during pregnancy is contra-indicated.

A soft diaper forms the best support, and the patient must lie up as far as she is able. The parts should be kept scrupulously clean by bathing several times a day with a weak antiseptic solution.

If such a cervix delays labour it can be incised or stretched with dilators, and Cæsarean section has even been performed in such a case.

PROLAPSE OF THE VAGINAL WALLS.

Where laxity of the vaginal walls exists, pregnancy accentuates the condition.

The most common displacement is that of the anterior vaginal wall resulting in a cystocele, but a rectocele may also be present. The displacement tends to be remedied in the later months.

DIAGNOSIS.

Vaginal prolapse must be diagnosed from a vaginal varix, or a tumour of the rectum or of the vaginal wall.

TREATMENT.

A ring pessary is the best means of restraining the protrusion. Where a ring cannot be worn, an indiarubber cup-and-stem pessary may effect the desired result.

It is highly important to impress on a pregnant woman wearing a pessary the necessity of douching the vagina and of having the pessary changed at least every two months. A pessary in a foul condition obviously endangers the puerperium.

MALPOSITION OF THE OS UTERI.

The os uteri may be looking forward, backward or to the sides, and the displacement may be so marked in the backward and forward varieties that the os is only with difficulty palpated with the finger high up in the neighbourhood of the promontory of the sacrum, or behind or above the symphysis pubes, as the case may be.

CAUSES.

The commonest cause of marked malposition of the os is incarceration of the retroverted gravid uterus, see p. 168. The malposition may also be found in cases where the uterus has been ventrofixed, see p. 164. Rarely it may be due to the sacculation of the anterior or posterior part of the lower uterine segment, associated with an abnormal obliquity of the uterus.

RESULT.

The malposition of the os may cause a delay in labour, and in some cases serious obstruction.

DIAGNOSIS.

Two errors in diagnosis are stated to have followed the non-detection of the malposed os. The practitioner has mistaken the condition for one of atresia of the cervix, or has thought the cervix to be fully dilated, and endeavoured to apply forceps to the head covered by the cervix.

TREATMENT.

The treatment will depend upon the cause and extent of the displacement.

The subjects of retroverted gravid uterus and pregnancy and labour after ventrofixation are discussed on pp. 166 and 164. Obstruction due to ventrofixation of the uterus demands Cæsarean section as a rule.

For the slighter degrees of displacement of the os, if it is possible to insert a de Ribes' bag through the cervix and thus dilate it, labour may be terminated satisfactorily with forceps. Attempts, however, to extract the child through the vagina with the os not properly dilated will very likely fail, and are fraught with the risk of rupture of the cervix or uterine body. If, therefore, the cervix cannot be dilated and got into such a position that extraction will be easy and safe, Cæsarean section is indicated as the best method of delivery.

ABNORMAL ANTEVERSION OF THE PREGNANT UTERUS.

This condition is seen under two circumstances. Firstly, in pendulous abdomen; and, secondly, after operative fixation of the uterus to the anterior abdominal wall.

Pendulous Abdomen.

CAUSE.

Pendulous abdomen is generally seen in pregnant women who have had many children. It is especially marked in cases of pregnancy complicated by a flat pelvis, because the head is compelled to lie above the pelvic brim, and this is the commonest cause in primigravidæ. It is also seen in pregnant women the subject of marked kyphosis, see p. 318.

SYMPTOMS.

Its occurrence is associated with an abnormal sense of weight and abdominal discomfort.

SIGNS.

When the woman stands up the uterus falls forward and overhangs the pelvis; the skin of the lower abdomen may be eczematous. The most marked cases are those in which the recti are widely separated and the uterus escapes between them.

Its most serious aspect is its tendency to produce malpresentation and delay in labour.

TREATMENT.

An abdominal belt or a properly fitted pregnancy corset is indicated. The possible association of anteversion with abnormalities of the pelvis should not be forgotten.

Ventrosuspension and Ventrofixation and Pregnancy.

The effect of ventrofixation of the uterus on pregnancy and labour entirely depends upon the situation and extent of the artificial attachment.

Attachment of the uterus to the anterior abdominal wall, if performed in the most approved method, that is, by suturing a limited area of the anterior uterine wall to the parietal peritoneum (ventrosuspension), is not found to interfere materially either with pregnancy or labour. Where, however, a large area of the uterine wall has been attached to the parietal peritoneum and fascia, difficulties arise in direct proportion to the firmness of the attachment. This is especially so where the uterus has been fixed directly to the abdominal aponeurosis through a gap intentionally created in the parietal peritoneum (ventrofixation).

Greater dangers attend the fixation of the fundus or the posterior uterine wall, and vaginal fixation has been still more prolific of difficulties and disaster in childbirth.

The technique of the operation of ventrofixation as ordinarily carried out is planned to produce a short, stout, artificial ligament between the anterior wall of the uterus and abdomen respectively. This is achieved by three or four sutures which, passing through the fascia and peritoneum on either side of the abdominal wound, pick up the peritoneum covering the uterus and a superficial layer of its muscle. The front of the body of the uterus is thus brought up against the anterior abdominal wall, to the peritoneum of which it presently adheres. This adhesion, together with the tissue

formed as a result of the presence of the sutures, subsequently gets pulled by the weight of the uterus into a short ligament. Where this is the case the enlargement of the uterus due to pregnancy is practically not interfered with, and most patients proceed to term uneventfully, except that certain of them complain of some tenderness or pain over the abdominal scar.

Where, however, the expansion of the uterus is seriously

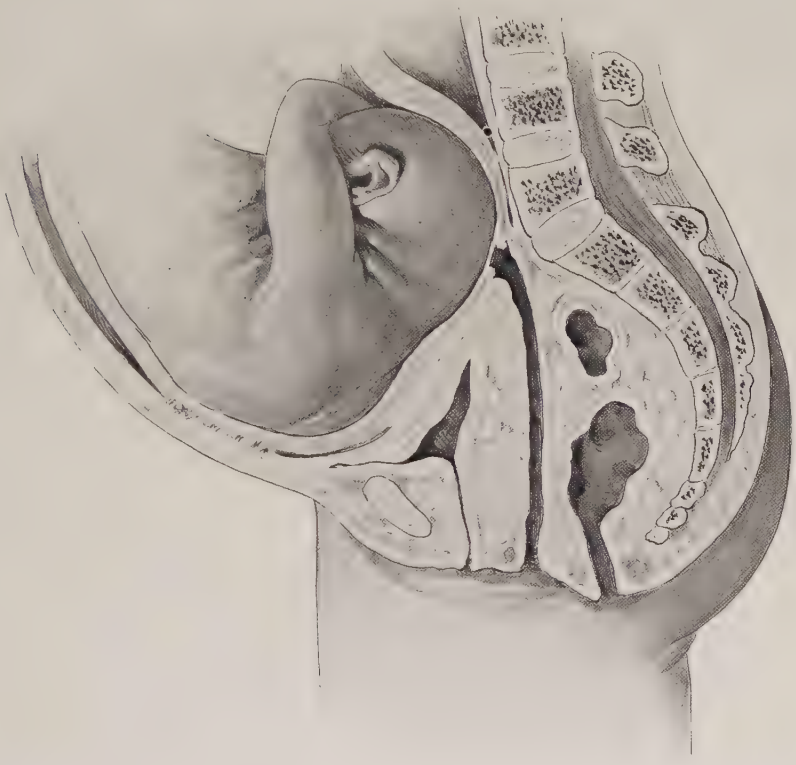


Fig. 14.—Displacement of the Os due to Ventrofixation.

interfered with, as after vaginal fixation or a too extensive or improperly situated attachment to the anterior abdominal wall, much pain is complained of from an early period, and in many cases abortion eventually occurs. In the rest, the pregnancy proceeds by a great development of the posterior uterine wall, which produces an anteversion so extreme that the cervix becomes greatly displaced upwards and backwards, and in labour there is great obstruction,

the axis of the cervical canal being directed backwards, so that the bag of membranes cannot dilate the os and the head is forced against the spine. The os itself may be almost inaccessible owing to the elongation of the vagina (Fig. 14).

TREATMENT.

The first pregnancy following ventrofixation should be kept under observation, and examined from time to time if necessary.

In the event of severe pain or signs of inevitable abortion, the uterus should be emptied. In performing this operation, the uterus must be handled as lightly as possible for fear of tearing the adhesions.

Where in the later months of pregnancy it becomes obvious that the displacement of the os is going to lead to obstructed labour, preparations for the performance of Cæsarean section should be made. This operation is dealt with on p. 658.

PREGNANCY AND RETROVERSION OF THE GRAVID UTERUS.

CAUSE.

A uterus previously retroverted may become pregnant, or the gravid uterus previously in a normal position may become retroverted as the result of sudden trauma. Of these two possibilities the former is doubtless much the commoner. In either event the softened state of the uterus produces an additional retroflexion, which becomes the more marked if from any cause the gravid organ is unable to rise out of the pelvis as pregnancy proceeds.

DIAGNOSIS.

A retroverted gravid uterus has to be distinguished from:

An extra-uterine gestation with pelvic hæmatocele.

A fibroid in the posterior wall of the uterus.

An ovarian cyst in Douglas's pouch behind a pregnant uterus.

Extra-uterine Gestation.—A hæmatocele, the result of tubal gestation, may closely simulate a retroflexed pregnant uterus; such a mistake may be the cause of serious danger to the patient.

Points of Resemblance.—In both there may have been a period of amenorrhœa.

In both there are present the minor signs of pregnancy.

In both there may be irregular loss of blood.

In extra-uterine gestation a decidual membrane may have been expelled, whilst the ovum or part of it may be expelled from a retroverted gravid uterus.

In both there is an elastic swelling in Douglas's pouch.

In both the cervix is driven forwards.

Points of Difference.—*In extra-uterine gestation:*

There is a history of abdominal pain when the rupture or abortion takes place.

The body of the uterus can be felt in its normal position, just driven forward a little. It may require an anæsthetic to make out this point.

The sound will show that the uterus is directed forward. With regard to the use of the sound as a method of diagnosis, it should of course be recognised that this instrument must not be used as a routine in these cases. Its use is only justified if there is *doubt* after it has been *decided* to open the abdomen, and *just* before the operation commences. In this case the use of the sound is legitimate, as it would be better to run the risk of producing abortion than to open the abdomen and find an intra-uterine pregnancy.

In a retroverted gravid uterus, on the other hand:

The cervix is tilted *upwards* as well as driven forwards.

The body of the uterus is absent bimanually from its normal position.

The sound would show that the uterus is lying backwards.

Fibroid Tumour in the Posterior Wall of a Pregnant Uterus.—In this case the cervix will be in a position more or less normal, the body of the uterus can be palpated bimanually, and in addition the fibroid will be felt in Douglas's pouch. The fibroid will be harder than the body of the gravid uterus and not elastic. Difficulty arises when the patient is too stout and rigid for a satisfactory bimanual examination to be made.

Ovarian Cyst in Douglas's Pouch behind a Pregnant Uterus.—In this event a bimanual examination would show that the uterus was lying in front of and apart from the tumour.

RESULTS.

1. Retroversion of the gravid uterus markedly tends to abortion, not merely on account of the displacement, but because in a large proportion of such cases the uterus itself has been the seat of previous inflammatory changes.

Presuming the pregnancy to continue,

2. The uterus may rise out of the pelvis, in which case the deformity is gradually rectified; or

3. During the third month the retroflexed uterus *incarcerates* under the promontory of the sacrum. This is more likely to happen

if the pelvis is flattened and there is abnormal projection of the sacral promontory.

Incarceration of the Gravid Uterus.

SYMPTOMS.

The symptoms of incarceration of the gravid uterus are very typical. Almost since the onset of pregnancy the patient notices an increasing degree of bladder irritability and pelvic pain.

This is due to the pressure and upward drag on the bladder that the enlarging uterus produces. Eventually retention of urine occurs; very constantly at the fourth month. By this time the uterus entirely fills the pelvis, and the urethra is greatly elongated. In many cases when the symptoms suddenly supervene definite inability to pass water is complained of, together with severe abdominal pain, *but it is important to remember that in others where the onset is more gradual the frequency of micturition at first complained of passes directly into the incontinence due to an overfull bladder.*

In such the retention of urine has been gradually going on for some time beforehand, the patient leaving an increasing quantity of "residual" urine each time she micturates.

SIGNS.

On investigation a large tumour is found in the abdomen; *it is the distended bladder.* Vaginal examination reveals the cervix greatly displaced upwards and forwards, and behind it is an elastic mass, the gravid uterus, filling the pelvis (Fig. 15).

RESULTS.

Spontaneous rectification may take place slowly or very suddenly, the patient feeling the uterus spring up out of the pelvis.

The uterus may empty itself.

The uterus may sacculate and pregnancy proceed.

The uterus may remain incarcerated. The outlook for a case like this is very grave if unrelieved. A virulent cystitis is set up, the infection of which extending along the already dilated ureters produces acute pyelonephritis, or sloughing of the bladder wall and rupture of that organ may result.

DIAGNOSIS.

The common cause of a mistaken diagnosis is the failure on the part of the practitioner to realise that the tumour he feels in the abdomen is the bladder.

This is the more likely to occur if the case be one of those in which a history of retention of urine is absent, the primary frequency

of micturition having passed imperceptibly into the incontinence of retention.

The catheter should always be passed in such cases, when, if the condition be due to incarceration of the gravid uterus, the prominent abdominal tumour at once disappears, but that felt from the vagina remains. In a thin patient an indefinite soft swelling

Fig. 15.—Retroverted Incarcerated Gravid Uterus.

filling the pelvis can now be felt from the abdomen, but this is not possible in fat women.

The following conditions causing retention of urine simulate incarceration of the gravid uterus:

Incarceration of an ovarian cyst behind the gravid uterus.
Incarceration of a uterine fibroid behind the gravid uterus.
Incarceration of an ovarian cyst behind the non-gravid uterus.
Incarceration of a fibroid behind the non-gravid uterus.
Extra-uterine gestation with hæmatocele.

Incarceration of an Ovarian Cyst behind the Gravid Uterus.—In most cases of incarcerated gravid uterus there is a clear history of three or four months' amenorrhœa preceding the appearance of acute symptoms. In a few irregular hæmorrhages may have occurred though regular "periods" were absent.

The accessory signs of gestation are also present. Thus there

Fig. 16.—The Lower Pole of an Ovarian Cyst incarcerated in the Pelvis behind an early Pregnant Uterus.

is usually no difficulty in recognising the fact of pregnancy. Where, however, the catheter has not been used, it is a common mistake to regard the swelling felt per abdomen as the pregnant uterus and that felt per vaginam as an incarcerated ovarian tumour.

Even supposing such an elementary point as the passage of the catheter has been omitted, the position of the cervix should call

attention to the real state of affairs, for impacted tumours lying behind the uterus never tilt the cervix in the manner described, but push it forwards against the pubis (Fig. 16).

Moreover, after the bladder has been emptied, the uterus can be felt pushed forwards against the anterior abdominal wall and more or less distinguishable from the tumour, but if the condition

Fig. 17.—A Fibroid of the posterior Uterine Wall incarcerated in the Pelvis behind the Pregnant Uterus.

be due to an incarcerated gravid uterus, nothing can be distinctly felt above the pubis.

Incarceration of a Uterine Fibroid behind the Gravid Uterus.—The cases most difficult to make out are those where incarceration of a fibroid projection of a gravid uterus has occurred (Fig. 17).

In such the uterus as a whole may be retroverted, and thus the position of the cervix somewhat simulates that seen in incarceration of the gravid uterus itself. But here again a tumour can be felt per abdomen after the bladder has been emptied (Fig. 18).

Incarceration of an Ovarian Cyst behind the Non-gravid Uterus.—As regards incarceration of an ovarian cyst apart from pregnancy, the only point of likeness would occur if amenorrhœa had preceded the onset of symptoms. This is possible in bilaterial ovarian growths destroying both ovaries.

The uterus, however, will be felt unenlarged in front of the mass, and the cervix is merely displaced forwards, not tilted.

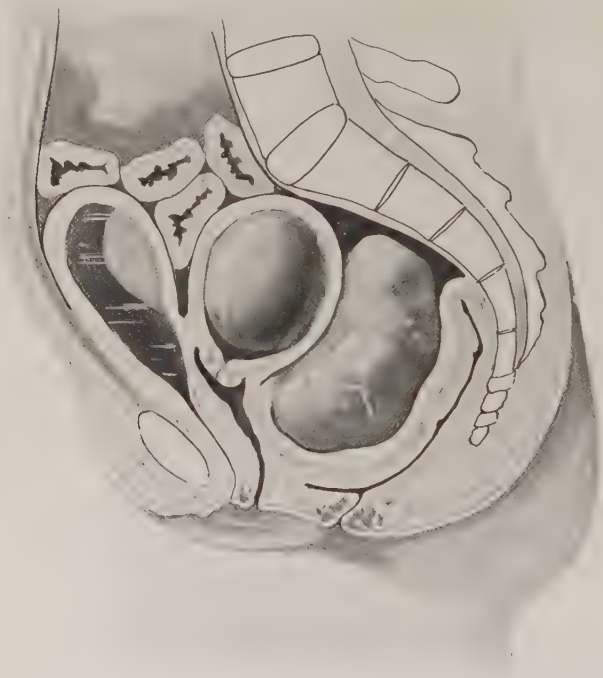


Fig. 18.—An Incarcerated Fibroid lying behind a Retroverted Gravid Uterus.

Incarceration of a Fibroid behind the Non-Pregnant Uterus.—A fibroid of the uterus may retrovert it and become incarcerated. In such a case the general shape and position of the uterus closely resembles one pregnant, and the cervix undergoes the same tilting. There is, however, a history of menorrhagia, not amenorrhœa.

Extra-uterine Gestation.—If the hæmorrhage is severe and the pelvic hæmatocele very large, the uterus may be driven so far forwards that the cervix presses against the bladder, and retention of urine is the result. The points distinguishing a hæmatocele from a retroverted gravid uterus have already been considered.

Difficulty in diagnosis is more likely to occur before incarceration than after incarceration, and we repeat that the mistake—and a serious one—most often made is to confuse an extra-uterine gestation with a retroverted gravid uterus threatening to miscarry.

TREATMENT OF RETROVERSION OF THE GRAVID UTERUS.

Before Incarceration.—If retroversion of the uterus is discovered

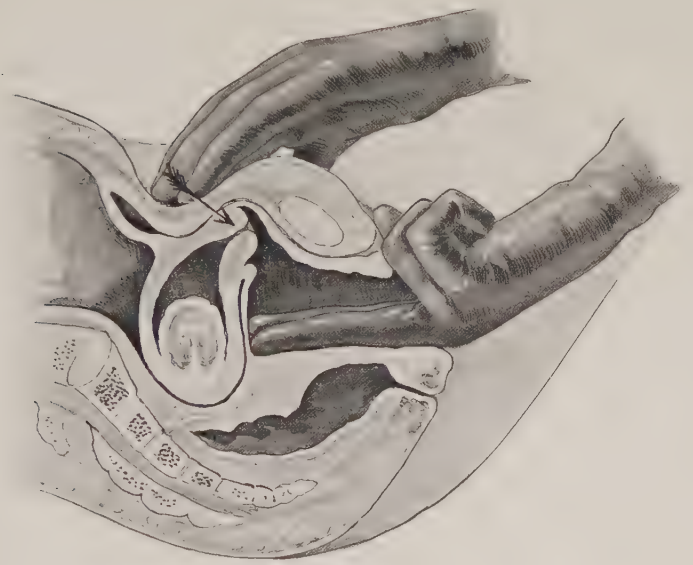


Fig. 19.—Reposition of the Retroverted Gravid Uterus. Pressing back the Cervix and pushing up the Body.

at an early stage of pregnancy, the following methods of treatment are available:

1. Reposition by manual manipulation, and the insertion of an indiarubber watch-spring ring pessary.

2. Wait for the uterus to right itself.

Manual Reposition.—The patient being placed upon her left side, steady pressure is made by the index finger of the right hand through the posterior vaginal vault on the body of the uterus until it is felt to move upwards (Fig. 19).

The surgeon now places his left hand under the patient s waist and raises her into the knee-chest position. Pressure is again made on the uterine body, and the index finger is then transferred to the

cervix, which is abruptly tilted back so as to swing the fundus forwards (Fig. 20).

These movements are repeated until the axis of the uterus is pointing to the umbilicus.

The patient is now brought into the oblique side position, see Fig. 2, while the index finger in the vagina keeps the cervix pressed towards the hollow of the sacrum. The left hand is then transferred to the abdomen and the uterus manipulated bimanually until the body is brought into extreme anteversion, *i.e.*, it can be felt lying along the anterior vaginal wall. The pessary, a ring or Hodge, whichever suits best, and which should be large enough

FIG. 20.—Reposition of the Retroverted Gravid Uterus. Pressing the Cervix backwards.

to slightly stretch the anterior vaginal wall, is then inserted. If the uterus remains in anteversion, the pessary should be worn until the end of the fourth month.

A large proportion of early gravid retroverted uteri may be successfully dealt with in this way.

Wait for the Uterus to Right Itself.—Supposing reposition to be impossible or the uterus to return to its retroverted position, the patient should be kept under observation. In most cases, if abortion does not occur, the organ gradually rises out of the pelvis as the pregnancy proceeds.

In a few, however, the uterus does not right itself and symptoms of beginning incarceration make their appearance.

After Incarceration.—In this case, as in those in which incarceration is already an accomplished fact, immediate reposition is called for.

The most serious aspect of these cases is the presence of severe cystitis, which complicates those in which treatment of the condition has been delayed too long. All the fatalities are due to this cause.

If inflammation of the bladder is threatened or is already present, the viscus should be washed out at least twice a day with boracic

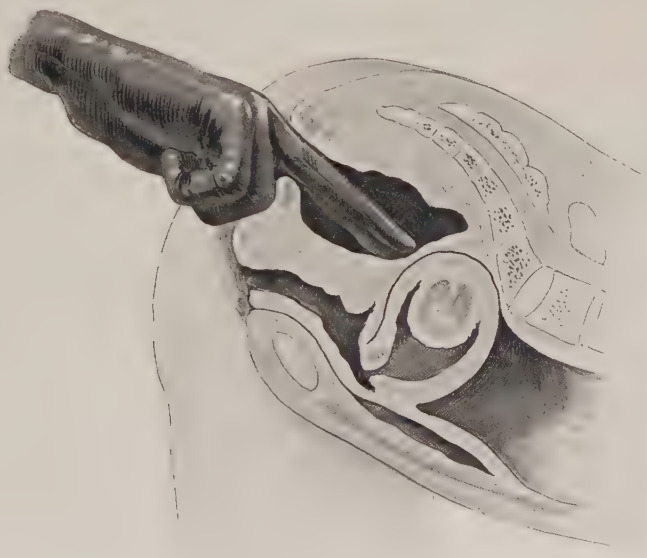


Fig. 21.—Reposition of the Retroverted Gravid Uterus by rectal pressure.

acid solution, and urotropin or salol should be given by the mouth. If the inflammation of the bladder is so acute that its wall necroses, blood clot and sloughs will collect in the bladder, which may then be difficult to empty by catheter. In such a case, if the bladder cannot be emptied by catheterisation of the urethra, suprapubic puncture must be performed, and the impaction relieved immediately afterwards.

The following methods of treatment are available:

1. Manual reposition with or without an anæsthetic.
2. Inserting a bag or watch-spring pessary into the vagina.
3. Induction of abortion.

4. Replacing the uterus through an abdominal incision.

It is very important to have the bladder emptied before any of these methods are tried.

Manual Reposition.—The method of doing this has already been fully explained, but the pressure should be first applied so as to press the uterus rather to one side so as to escape the sacral promontory. If there is any difficulty the patient should be anæsthetised, when, with three or four fingers in the vagina, and the resistance of the patient abolished, a successful result is often obtained after failure without chloroform. In these cases also an endeavour may be made to push the fundus up with the fingers in the rectum (Fig. 21),

FIG. 22.—Reposition of the Retroverted Gravid Uterus. Pressing on the body and pulling down the Cervix.

or the cervix, if it can be secured, may be seized with a volsellum and pulled upon at the same time that pressure is made on the fundus through the vagina or rectum (Fig. 22). This method has the objection that the pregnant cervix easily tears.

If this method fails and the patient's condition is not urgent she may be kept in bed, have the urine drawn off regularly, and in a few days further attempts may be made. During this enforced rest the incarcerated uterus may right itself.

Inserting a Bag or Pessary into the Vagina.—A small size de Ribes' bag can be put into the vagina and distended with air or water. By such continuous pressure the uterus will sometimes be rectified when the other methods have failed. It is, however, a very painful

method of treatment, and the patient has to be kept somewhat under the influence of opium whilst the bag is in the vagina. An india-rubber watch-spring pessary large enough to distend the vagina may be used in place of the bag, but it will probably be futile.

In a few cases reposition of the retroverted uterus is found to be impossible by the methods already detailed, chiefly in women in whom the sacral promontory is unduly prominent, or when the uterus is fixed in its abnormal position by adhesions.

The obstetrician has two further courses open to him:

To endeavour to empty the uterus through the vagina.

To open the abdomen and manipulate it from above.

Induction of Abortion.—The induction of abortion is generally a difficult proceeding; it is best performed by rupturing the membranes, and after the liquor amnii has drained away the diminution in the size of the uterus may allow of its being rectified. Owing to the inaccessibility of the external os, which is at times above the level of the symphysis pubis and almost resting on it, it may be very difficult to get to the cervix to dilate it. It may even be impossible to pass a sound to rupture the membranes.

Abdominal Section.—As a matter of experience abdominal section is very rarely called for, but in our opinion it is a better proceeding than inducing abortion, with the risks of hæmorrhage and sepsis that attend it in these cases, and it has been satisfactorily performed. If the practitioner knew that the patient had had a firmly fixed retroverted uterus before she became pregnant, abdominal section would be clearly indicated as an early resource. Pregnancy in such a uterus is, however, very unlikely.

SACCULATION OF THE UTERUS.

CAUSE.

As already noted, sacculation of the uterus may result from an incarceration, or occur in patients, on whom ventrofixation has been performed.

SIGNS.

With retroversion the sacculation takes place in the anterior wall of the upper uterine segments, with the result that most of the child escapes into the pouch thus formed, the head or breech, according to the presentation, remaining in the retroflexed portion of the uterus situated in the pelvis. After ventrofixation it is the posterior wall that sacculates.

RESULT.

Pregnancy may proceed to term, when the contractions of the

uterus may straighten it, or obstruction may result from the malposition of the cervix.

TREATMENT.

If delay in labour occurs, an attempt should be made to straighten the uterus and dilate the cervix, after which a leg should be brought down.

If such treatment is found to be impossible, Cæsarean section will be necessary.

FIG. 23.—Gravid Uterus in a Hernia Sac, the result of an abdominal operation.

THE GRAVID UTERUS IN A HERNIA SAC.

One of the contents of a hernia may be the gravid uterus. Obviously this is most common in the case of ventral hernias

especially those due to the giving way of the scar of a previous abdominal section (Fig. 23).

Exceptionally the pregnant uterus has been found in the sac of an inguinal hernia, and this most often when a condition of uterus duplex existed.

TREATMENT.

An operation for the repair of a ventral hernia should as a rule not be attempted if the patient is pregnant because of the liability of the new scar to stretch as the gestation proceeds. A suitably fitting belt should be worn.

In very exceptional cases of scar hernia, where the pregnant organ in the later months entirely occupies the sac and the skin covering it is actually in danger of giving way, an abdominal operation would be justifiable. In such an event, a Cæsarean hysterectomy would probably be the best procedure, followed by excision of the hernia and plastic repair of the wound so as to get as sound a scar as possible under the circumstances.

The laxity of the abdominal wall that followed the removal of the uterus and gestation would permit of a larger proportion of the hernia sac being removed than would otherwise be the case, and, moreover, the wound during convalescence would be under less tension than is ordinarily the case in operations for scar hernia, and therefore it would be more likely to heal strongly.

A pregnant uterus in an inguinal hernia sac should be returned into the abdomen, or removed according to the circumstances, see p. 184, and the hernia radically repaired.

INVERSION OF THE UTERUS.

Inversion of the uterus is one of the rarest complications of labour.

It may take place at the time of labour or it may occur some hours afterwards.

In the first type, the placenta may be still attached when the accident occurs, but in these it is almost certainly morbidly adherent. In the second, the inversion probably begins during the third stage, and is consummated after the lapse of some hours by constantly recurring uterine contractions.

CAUSE.

In all cases unusual laxity of the uterine wall must be present to permit of inversion.

Given this laxity the determining agents may be divided into two groups :

1. Those that act by pressure from above.
2. Those that act by traction from below.

Pressure from above.—Inversion from this cause may be spontaneous or due to operative manipulations.

Spontaneous.—Owing to some bearing-down effort of the patient, more especially if she happens to be sitting up just after labour, a part of the fundus may be depressed. This acts as a foreign body, and the uterus contracting upon it causes further inversion.

Fig. 24.—Complete Inversion of Uterus and Vagina.

Operative.—If during the absence of a pain the practitioner endeavours to express a placenta, and especially if he does so in the wrong direction, he may cause an inversion. This accident has also been caused in a similar way when compressing the uterus for hæmorrhage.

Traction from below.—Traction on the cord by midwives to hasten the delivery of the placenta is a fairly common practice even at the present day. If one refers to the reported cases of inversion of the uterus, one finds that the commonest cause is due to this malpraxis.

Traction on the cord may be exerted in other ways less reprehensible, as when the child is born by precipitate labour, the mother being in the upright position, or when, owing to the cord being

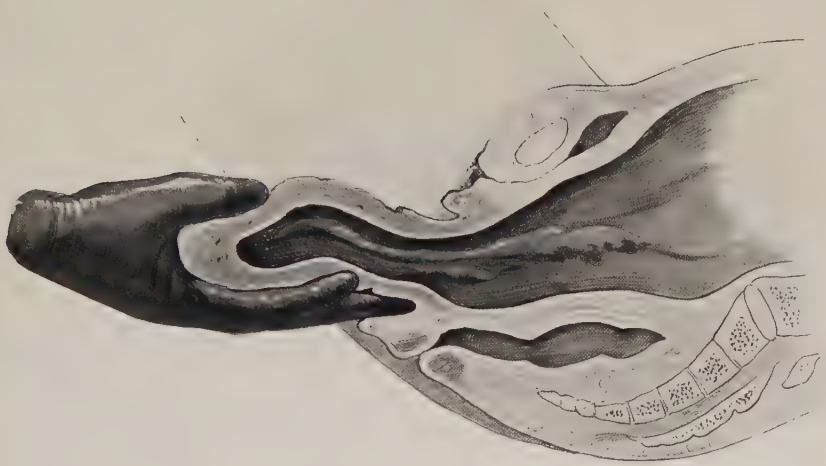


FIG. 25.—Reposition of an Inverted Uterus, first stage.

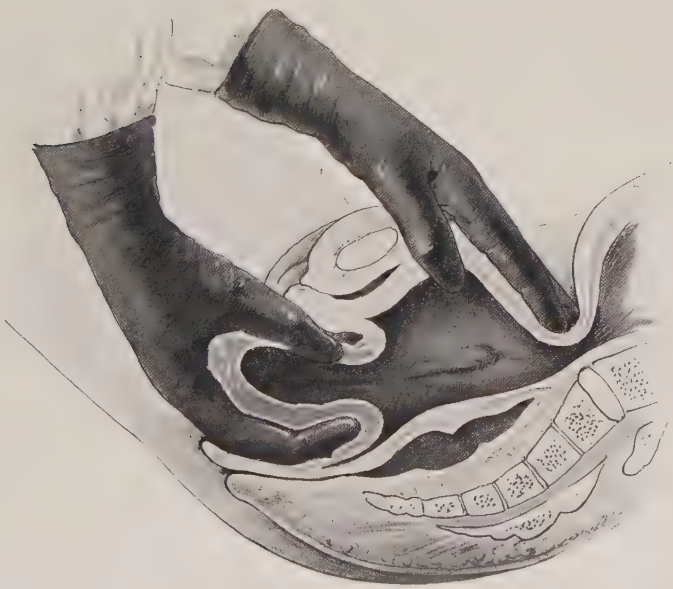


FIG. 26.—Reposition of an Inverted Uterus, second stage.

round the child's neck, traction is exerted upon it during the birth of the second stage.

Occasionally inversion is brought about by the traction of a pedunculated submucous myoma in process of extrusion.

The extent of the inversion may vary from a slight dimpling of the fundus to complete inversion of the body and cervix, further complicated by prolapse of the vagina.

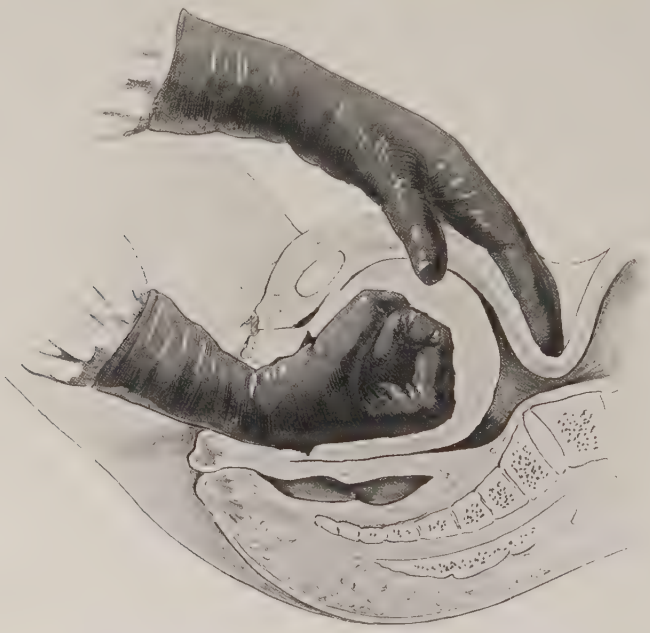


Fig. 27.—Reposition of an Inverted Uterus, third stage.

SYMPTOMS.

When occurring at labour, the inversion is marked by severe pain, a sense of something passing down the vagina, profound shock, and, unless the placenta be still adherent, free hæmorrhage.

When occurring somewhat later, the actual appearance of the inverted uterus is preceded for some time by spasmodic pains and undue loss from the uterus.

Lastly, the symptoms may not declare themselves for weeks after labour, as in the three cases we have seen.

DIAGNOSIS.

If the placenta is adherent, it is impossible to make a mistake, since attached to the inverted mass is seen the placenta with the umbilical cord (Fig. 24).

If the placenta has separated, an inverted uterus might be mistaken for an extruded uterine myoma, but inspection of the mass and the absence of the uterus from its normal position, as verified by an abdominal examination, would immediately prove the nature of the case.

If the fundus only is inverted, giving rise to pain and hæmorrhage, a cupping might be felt per abdomen.

The inverted uterus has been mistaken for the head of another child and torn off in the endeavour to extract it. The patient recovered. The inverted horn of a double uterus has also been removed under the assumption that it was a polypus.

The shock associated with inversion is out of all proportion to the amount of hæmorrhage.

PROGNOSIS.

The prognosis is always grave, but depends upon the available treatment. If efficient help is at hand and immediately applied, the mortality is somewhere about 14 per cent. Otherwise it runs up to over 40 per cent. Death is due to shock, hæmorrhage, or sepsis.

TREATMENT.

An inverted uterus must immediately be replaced. If anæsthesia is available, the operation is facilitated, but the obstetrician should not delay the reposition to obtain it.

The mass should be grasped with one hand and pushed upwards, the portion that came down last being replaced first, as in a hernia. The other hand should be applied to the abdomen to support the uterus as it is being reinverted (Figs. 25, 26, 27).

If the placenta is still adherent it should not if possible be removed until the displacement is rectified.

Directly the uterus is returned, a hot intra-uterine douche should be administered, and the organ kneaded and compressed to excite retraction. Ergotin or pituitary extract should be given hypodermically to the same end, while collapse must be treated by the measures described under Post-partum Hæmorrhage.

Failure to replace the organ has sometimes occurred in those cases which occur some little time after labour. These should be dealt with by an Aveling's repositor. Very rarely the inversion has spontaneously corrected itself. By a curious coincidence, this occurred in two of our three cases whilst they were in bed waiting for the wooden cup of Aveling's repositor to be turned the proper size.

PREGNANCY AND HERNIA.

INGUINAL OR FEMORAL HERNIÆ.

Inguinal or femoral herniæ tend to be temporarily cured by pregnancy, because the uterus as it ascends pushes the intestines upwards and displaces them from the hernial sac. Thus the protrusion often disappears during the second half of gestation, probably to return at some period after the birth of the child.

Where omentum or intestines are adherent to the sac, this spontaneous reduction cannot occur, and there is then a risk of injurious traction, producing at first pain and later symptoms of intestinal obstruction. It is, however, a rare event in practice.

The pregnant uterus or the pregnant horn of a bicornuate uterus has been found in an inguinal hernia, and the hernia has become strangulated or the uterus has aborted.

UMBILICAL OR VENTRAL HERNIÆ.

The contents of the sac of an umbilical or ventral hernia are spontaneously reduced as a rule as the uterus rises. If the gut or omentum is adherent, the possibility of injurious traction is greater than in the case of inguinal or femoral hernia.

When the sac is large enough the gravid uterus may occupy it.

TREATMENT.

No operative interference is indicated unless the hernia is causing serious trouble. In this event it must be dealt with by the usual surgical measures.

If a gravid uterus forms part of the contents of an inguinal hernia, the hernial sac should be opened, the uterus and intestine reduced, and the opening closed.

If a gravid uterus was found forming the contents of an umbilical or ventral hernia, the pregnant uterus should be either returned into the abdomen or subjected to Cæsarean hysterectomy as the circumstances warranted, see p. 179. It has been found necessary in a case of incarceration of the gravid uterus in a ventral hernia to perform the latter operation, and it might also be required if the sac wall was so thinned as to make spontaneous rupture likely.

CHAPTER XIV.

Tumours of the Uterus and Ovary in Connection with Childbearing.

MYOMA COMPLICATING PREGNANCY.

Effect of Pregnancy on the Myoma.

The pedicle of a subserous myoma is more likely to become twisted in the pregnant than in the non-pregnant because of the softening of the uterine muscle, and the rare complication of torsion of the uterus on its cervix at times occurs for the same reason.

During pregnancy a myoma may rapidly increase in size and cause such abdominal distension that active treatment is necessary.

A myoma by its increased growth may become impacted in the pelvis, giving rise to very serious symptoms.

The tumour may degenerate, more especially undergoing that form known as red degeneration or necrobiosis, in which the tumour becomes enlarged, painful and very tender, and fever supervenes.

Effect of the Myoma on Pregnancy.

A myoma, more particularly when situated on the posterior wall of the uterus, may retrovert this organ, eventually causing incarceration.

As a rare cause of accidental hæmorrhage, the tumour may be the means of terminating pregnancy prematurely.

TREATMENT.

Unlike ovarian tumours complicating pregnancy which, with but few exceptions, should always be removed directly suitable arrangements can be made, myomata complicating pregnancy may be left alone except under certain circumstances shortly to be noted.

There are several reasons why, in most cases, the treatment should be expectant. As a matter of common experience, the majority of women whose wombs are the seat of these tumours pass through pregnancy, labour, and the puerperium without any discomfort or trouble of any kind, and the combination of a myoma and pregnancy is not so particularly uncommon.

Then it must be remembered that any interference with the tumour of an operative nature, apart from hysterectomy, will most probably lead to a miscarriage or premature labour, whilst if any operation is undertaken it will generally have to be a hysterectomy. It is thus evident that to operate for a myoma on a pregnant uterus will in all cases imperil the life of the child and in most cases destroy any chance of future fertility.

Again, the tumour is generally subperitoneal and therefore not so likely to cause trouble, whilst even one low down in the pelvis is very likely to become intra-abdominal with the elevation due to pregnancy.

Active treatment must, however, be undertaken under the following circumstances: If the tumour degenerates, if serious pressure trouble arises, if the pedicle becomes twisted, or if from the position of the tumour it is evident that the child cannot be born *per vias naturales*.

Degeneration.—The child, if viable, should be delivered by Cæsarean section, after which the uterus must be removed by supra-vaginal hysterectomy or pan-hysterectomy, unless, as is sometimes found to be the case, the tumour can be enucleated or its pedicle ligatured and severed.

Pressure.—Pressure due to abdominal distension and to pelvic impaction must be treated by cœliotomy, and, as in many of these cases it will be found that the tumour is a subserous one, it may be possible to ligature the pedicle and remove the tumour without disturbing the pregnancy. On the other hand, hysterectomy may be necessary unless enucleation will suffice.

In cases of pelvic impaction an attempt may first be made to push the tumour out of the pelvis per vaginam, the patient being fully anæsthetised. Such a proceeding is, however, only justified in a small proportion of cases.

Torsion.—If the pedicle is twisted it can be ligatured and the tumour removed. If the uterus is twisted a viable child should be delivered by Cæsarean section and the uterus removed by hysterectomy.

Anticipating Obstruction.—If it is apparent that the tumour is so situated that obstruction at term must result, Cæsarean section should be carried out a day or two before term, and the uterus dealt with according to the nature and position of the tumour.

The ideal proceeding in these cases is to enucleate the tumour or tumours and spare the uterus, because its functional value is proven and it is worth conserving. This operation has been lately carried out by one of us, no less than six separate tumours being removed. Although on first consideration it might be thought that such a

proceeding would be accompanied by dangerously profuse hæmorrhage, this is not the case owing to the actively retractile state of the uterine muscle. It is important that the cavities left after enucleation be entirely obliterated by the use of catgut sutures. If for any reason enucleation is deemed inadvisable, subtotal hysterectomy should be performed.

After operations on the pregnant uterus which do not include the

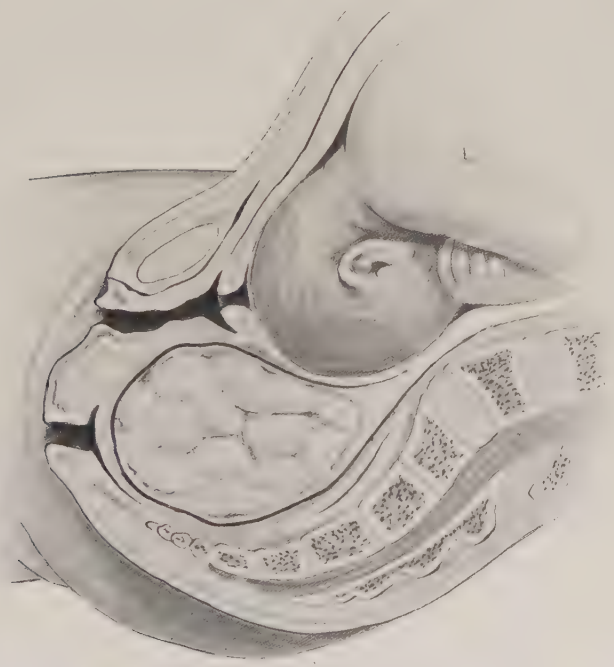


FIG. 28.—Pedunculated Subperitoneal Myoma impacted in the Pouch of Douglas and obstructing Delivery.

removal of the child, the patient should be kept well under the influence of morphia to prevent the uterus, if possible, expelling its contents.

MYOMA COMPLICATING LABOUR.

Effect of Labour on the Myoma.

The tumour may not be large enough to cause obstruction, but during the efforts of nature to expel the child, or of the doctor to extract it, the tumour may be bruised and become septic during the puerperium.

Effect of the Myoma on Labour.

The tumour may be the direct cause of obstruction or of hæmorrhage.

Obstruction.—Obstruction may occur in various ways. Thus a submucous myoma may be situated below the presenting part, or a subperitoneal tumour may occupy a similar position (Fig. 28),

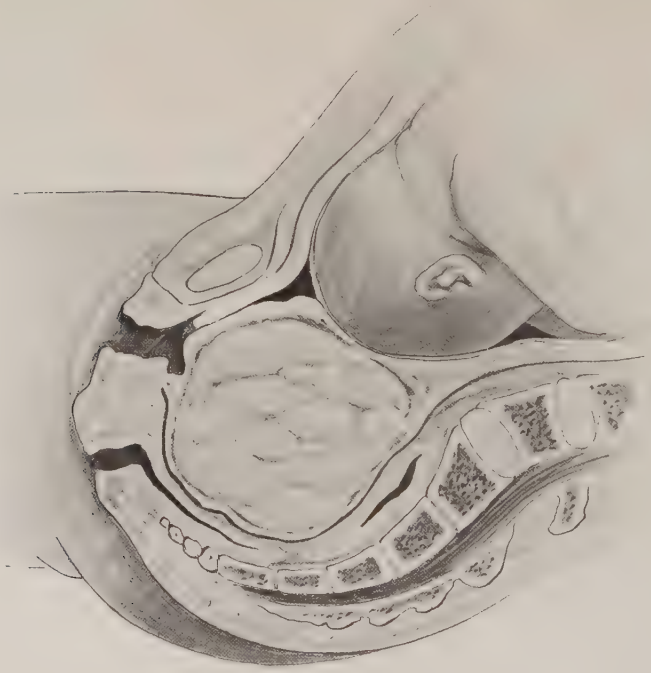


FIG. 29.—Cervical Myoma obstructing Delivery.

whilst a cervical myoma will almost certainly prevent the birth of the child (Fig. 29).

Hæmorrhage.—It has happened that during the uterine contractions omentum which has been adherent to a myoma has been torn, resulting in serious intra-peritoneal bleeding.

Myomata have also been associated with inversion of the uterus and with post-partum hæmorrhage due to insufficient retraction, a fatal case of which we have knowledge of.

TREATMENT.

Hæmorrhage. — Intra-peritoneal hæmorrhage must be met by opening the abdomen and ligaturing the bleeding vessels.

Post-partum hæmorrhage must be treated as indicated on p. 274.

Obstruction.—If the tumour can be pushed out of the way of the advancing child, the patient being fully anæsthetised, this may be done, the child being at once delivered by forceps or breech-traction.

This treatment is not without danger, for the tumour may be injured during the necessary manipulations, and by subsequent necrosis kill the patient as in a case we remember; or a mistaken diagnosis may have been made, the tumour being an ovarian cyst. Further forcible replacement of pedunculated tumours may be followed by axial torsion.

Where, however, the obstetrician lacks the skill or assistance necessary for an abdominal operation, the proceeding is justifiable, but a careful watch must be kept against the supervention of signs of infection or necrosis of the tumour.

In general, labour obstructed by a myoma is best treated by an abdominal operation. On the abdomen being opened, the tumour may be removed by enucleation, by ligature of its pedicle, or by hysterectomy, the child being first delivered by Cæsarean section. After myomectomy it is possible to allow natural labour to proceed, but in our opinion the better treatment is to perform Cæsarean section, followed or not by hysterectomy according to the conditions that obtain, see p. 186.

In the case of a submucous polypus projecting below the presenting part, the stalk should be severed and the tumour removed. If the tumour is sessile and not too large to be enucleated, this should be done by incision of the capsule; but if it is too large for such a proceeding, the child must be delivered by Cæsarean section and the tumour dealt with afterwards as seems best.

MYOMA COMPLICATING THE PUERPERIUM.

Effect of the Puerperium on the Myoma.

If uterine sepsis has followed labour or a miscarriage, a myoma may become infected. As a result, the tumour may suppurate and be discharged piecemeal, or suppuration may take place round its capsule and the tumour be expelled entire. In the absence of effective treatment the patient may succumb to the infection before the tumour is expelled.

Torsion of the pedicle of a subperitoneal fibroid may occur during the puerperium, and is ascribed to the sudden alteration in the relation of the parts.

Necrobiosis is the commonest form of degeneration noted as being associated with the puerperium.

A submucous myoma may be extruded during the puerperium. When pedunculated it may appear in the vagina directly after the birth of the placenta or even before the placenta is separated, or it may not be noticed for some hours or days after the delivery.

In the latter case its extrusion is preceded by undue hæmorrhage, and colicky pain resembling severe after-pains.

Sessile tumours may also be extruded, and occasionally such a one may be the cause or the accompaniment of inversion of the uterus, see p. 182.

As a rule, however, the process is more or less septic, the escape of the tumour being due to necrosis of its capsule. Under these circumstances the symptoms of puerperal sepsis will be present, and if the mass be gangrenous a very foul discharge may occur.

The extruding tumour may be mistaken for a portion of the placenta, or, if the placenta has not yet been delivered, for that structure itself.

Its firm resistance and careful manual examination should prevent this error.

From an inverted uterus it is recognised by the coincident presence of the mass of the uterus felt in the abdomen, see p. 183.

Effect of the Myoma on the Puerperium.

During labour the myoma may be bruised, in which case it is apt to become septic, and if its presence remains undiagnosed the case may be regarded as one of puerperal sepsis.

After the child has been expelled a myoma, which was before resting above the brim of the pelvis, may slip down into the pelvis, become impacted and be the cause of dangerous pressure.

A myoma may be responsible for secondary post-partum hæmorrhage, for subinvolution of the uterus, or for misplacement, of the puerperal uterus.

TREATMENT.

If the practitioner is aware of the presence of a myoma, a careful watch must be kept during the puerperium for any of the complications noted, and these, if they arise, must be dealt with accordingly.

In general, it may be said that signs of sepsis, torsion or impaction should be treated by immediate abdominal section.

Submucous tumours presenting in the vagina should be removed by this route.

If pedunculated, the pedicle should be first twisted by rotating the tumour and then divided with scissors, but if sessile or partially

sessile, the capsule of decidua covering the mass should be incised and the tumour enucleated.

It is important to remember that before anything is cut away or enucleated, the nature of the mass felt must be ascertained beyond a doubt by a thorough examination so as to exclude inversion of the uterus.

If enucleation is impossible, the uterus must be removed.

If septic infection is present, the uterus should be thoroughly explored with the fingers after the tumour has been removed and all loose fragments in the cavity cleared out, which should then be thoroughly irrigated with an antiseptic solution. For the rest, treatment will be similar to that of the commoner forms of puerperal sepsis as described in Chapter XXV.

CANCER OF THE CERVIX COMPLICATING PREGNANCY.

Such cases will present themselves under four conditions:

1. When the cancer is operable but the child not viable.
2. When the cancer is operable and the child is viable.
3. When the cancer is inoperable but the child is not viable.
4. When the cancer is inoperable and the child is viable.

Cancer Operable but the Child not Viable.

The uterus should be removed by the radical method associated with the name of Wertheim.

Cancer Operable and the Child Viable.

The child should be delivered by Cæsarean section, after which the uterus should be removed by the radical method.

The treatment indicated for the above two conditions is the correct one. In those cases, however, in which the practitioner has not had the experience necessary for this difficult operation, and cannot obtain the assistance of one who has, an alternative treatment, though much inferior, is available, namely, to remove the uterus by vaginal hysterectomy, emptying the uterus at the time of the operation if the child is not viable or inducing labour as a preparatory measure if it is.

Cancer Inoperable but Child not Viable.

The practitioner must be guided by circumstances, the chief of which will be the period of pregnancy at which the patient first comes under observation.

First Three Months of Pregnancy.—In this case we believe the best treatment is to evacuate the uterus and afterwards to scrape and cauterise the growth, for it is unlikely that the patient will go to term if her case is already inoperable according to the standard of the modern radical operation.

Last Six Months of Pregnancy.—In this case we believe the best treatment is to allow the pregnancy to go to term or viability and then to perform Cæsarean section, since evacuation of the uterus may be a very dangerous or even impossible procedure because of the size of the child.

Cancer Inoperable and Child Viable.

The child should be delivered by Cæsarean section. It has been advised in order to avoid the risk of peritoneal infection that the body of the uterus should be also removed, and the stump of the cervix then fixed in the abdominal wound. The proceeding might, however, leave a very foul sinus. High amputation well above the growth with intra-peritoneal treatment of the stump is probably best.

CANCER OF THE CERVIX COMPLICATING LABOUR.

The treatment will depend upon whether the cancer is operable or, being inoperable, whether the child is alive or dead.

Cancer Operable.

First Stage of Labour.—The child should be delivered by Cæsarean section, after which the growth should be dealt with by the radical operation.

Second Stage of Labour.—Labour should be terminated, with forceps if necessary, and the uterus should then be removed by the radical method.

If under the circumstances already noted the radical treatment cannot be carried out, an inferior method would be to perform a vaginal hysterectomy at the end of labour.

Cancer Inoperable, Child Alive.

Cæsarean section, followed by supra-vaginal hysterectomy.

Cancer Inoperable, Child Dead.

If the cervix is or can be sufficiently dilated to allow the crushed head of the child being delivered without any bruising or laceration to speak of, the child's head should be perforated and then delivered with the cranioclast.

If, however, such a procedure will result in laceration and bruising of the tumour, then because of the danger of the hæmorrhage and sloughing resulting therefrom, it will be safer to perform a Cæsarean hysterectomy after the manner already described.

CANCER OF THE CERVIX COMPLICATING THE PUERPERIUM.

Cancer Operable.—The growth should be dealt with by the modern radical abdominal operation.

Cancer Inoperable.—The palliative measures proper for inoperable cases unassociated with recent childbirth must be applied.

CHORIO-CARCINOMA.

ORIGIN.

Chorio-carcinoma is the most interesting of all forms of malignant disease.

It is not within the province of this work to minutely discuss its pathology, but it may be recalled that the fertilised ovum (oosperm) grafts on to and burrows into the maternal endometrium by the agency of the more peripheral cells of the cluster that results from its earlier divisions. These cells collectively form the *trophoblast*, a structure temporarily produced to secure the lodgment and nutrition of the growing ovum until such time as a system of villi can be formed.

The cells of the trophoblast are of two kinds: hyaline tesselated cells with a vesicular nucleus (Langhan's cells), and large multinucleated protoplasmic masses (syncytium).

Their action on the maternal tissues with which they come in contact is exceedingly destructive, the latter undergoing fibrinoid degeneration and later absorption, associated with which large extravasations of maternal blood occur as the decidual capillaries are opened up by the fœtal cells.

The maternal tissues bounding the periphery of an early growing ovum present, therefore, an invasive process which is identical in its character with that seen at the growing edge of a malignant tumour. Under normal circumstances, the destructive action of the trophoblast arrests and dies down coincidently with the development of a system of villi on the part of the chorion and a decidua on the part of the endometrium, whereby nutrition of the embryo is effected by transudatory exchange instead of by histolysis of the maternal tissues.

The trophoblast cells remain recognisable to term as the epithelium covering the villi and the so-called "compact layer of the serotina." Under certain circumstances, of which we are ignorant, the destructive growth of the trophoblast may exceed the limits of normality and originate a malignant tumour.

The mass thus formed has very marked characteristics. It is purple red in colour, of soft consistence, and grows with extreme rapidity. Microscopically, it is seen to be made up of masses of Langhan's cells and syncytium in varying proportion, together with large areas of blood extravasation; to the latter being due the extraordinary rate at which a nodule sometimes enlarges.

The tumour metastasises both by the blood and lymphatic streams, secondary nodules in the lungs being extremely common. The secondary growths have the same characteristic appearances as the primary.

It is well known that in a large proportion of cases of chorio-carcinoma the malignant disease has followed on or actually developed synchronously with a vesicular mole, see p. 238. The neoplasm can also develop after a normal pregnancy, or in the tube as the result of tubal gestation. Finally, there exist many recorded instances in which with a vesicular mole or normal pregnancy in the uterus, the primary growth occurred *in the vaginal wall*, presumably by deportation of elements of the trophoblast along the vaginal vessels or lymphatics.

SYMPTOMS AND SIGNS.

The symptoms vary according to the site of the primary growth, and the period at which it develops.

In the malignant vesicular moles, where trophoblastic malignancy develops synchronously with the mole, the symptoms are those of the latter condition as described on p. 238. It will be noticed that the uterus is growing very rapidly, and that the patient looks extremely ill and is wasting. In some instances the state of affairs has only been drawn attention to by the respiratory embarrassment caused by secondary involvement of the lungs.

In the more common type of case the disease develops from six weeks to three months after the pregnancy has been evacuated or expelled. In such bleeding is the leading symptom, associated with enlargement of the uterus, anæmia, wasting, and in many cases a foul discharge with fever and rigors.

A study of reported cases shows, as one might expect, that in a large proportion the symptoms were first attributed to retained con-

ception products which had become septic, and that the gravity of the condition was overlooked.

This is the more likely to happen because of the rarity of the disease, and the fact that evacuated masses of the growth have the appearance of blood clot mixed with placental *débris*.

Rare cases are met with in which the disease does not declare itself till many months after the pregnancy has terminated. In such the bleeding and uterine enlargement would mimic other neoplasms of the uterine body, such as a degenerating myoma or adeno-carcinoma.

Primary chorio-carcinoma of the tube is very rare. The symptoms and signs are those of a rapidly growing tumour in the region of the appendage, with pain and wasting.

Of great interest are those instances in which the primary growth takes place in the vagina. In a case lately under the care of one of us a woman about four months pregnant was seized with severe hæmorrhage from the vagina. Examination disclosed that the blood was coming from a small dark red nodule in the vaginal wall.

A diagnosis of ruptured varicose vein of the vagina was made, the nodule was removed, and the bleeding point controlled by suture.

With the idea that the nodule might possibly be one of chorio-carcinoma, a microscopical examination was made, and such was found to be the case. Before the report was ready a further serious hæmorrhage necessitated exploration of the uterus, when a vesicular mole was found and removed. This was followed by total hysterectomy and partial vaginectomy. Examination of the ablated uterus revealed no growth in it.

DIAGNOSIS.

The likeness to retained conception products has been commented upon. Chorio-carcinoma causes the uterus to enlarge. Retained conception products may arrest involution, but the organ does not increase in size. Where there is the slightest suspicion, the removed uterine contents should be examined microscopically.

The possibility of a malignant vesicular mole should be borne in mind where early pregnancy is associated with unexplainable anæmia, wasting, and perhaps fever.

Purple-coloured nodules in the vagina should always be regarded with the greatest suspicion. In the case referred to the bleeding had at first been attributed to threatened miscarriage.

Abderhalden's test appears to be positive in cases of chorio-

carcinoma, and hence such a finding in a suspected case, especially where the symptoms have followed the delivery of a vesicular mole, points very strongly to the presence in the uterus of active trophoblast.

TREATMENT.

The diagnosis having been established by microscopical examination of the uterine contents after exploration and removal, or by investigation of the vaginal nodule after excision, the fullest possible ablation of the uterus and adjacent parts should be performed.

It is noteworthy that although in general chorio-carcinoma may be said to rank amongst the most malignant growths known to the pathologist, yet a certain number of undoubted cases of spontaneous disappearance are to be found in the literature of the subject.

OVARIAN TUMOUR AND PREGNANCY.

Effect of Pregnancy on the Ovarian Tumour.

The tumour will increase in size more rapidly because of the greater blood supply, and its pedicle is much more likely to become twisted.

Effect of the Ovarian Tumour on the Pregnancy.

By its pressure the tumour may be responsible for marked œdema and troublesome vomiting. Miscarriage may result from its presence.

DIAGNOSIS.

For the diagnosis of an ovarian tumour complicating pregnancy, see p. 15.

TREATMENT.

The tumour should be removed as soon as the necessary arrangements can conveniently be made, for quite apart from its effect on pregnancy, should its pedicle become twisted, the tumour may inflame, rupture, or bleed, and even should the patient escape all these dangers, she has still labour and the puerperium to reckon with.

Although, as a rule, ovariotomy in a pregnant woman is attended with very gratifying results, nevertheless the liability of a miscarriage or premature labour following the operation must not be lost sight of, and it is, therefore, wise to keep the uterus quiet for the forty-eight hours following the operation by injections of morphia, the first dose of which may be given before the patient recovers from the anæsthetic.

The uterus may be injured during the removal of the ovarian tumour, in which case the hæmorrhage may be so severe that it will be necessary to remove the ovum, which had best be done by extending the wound into the uterine cavity. With proper care the uterus should not be wounded as badly as this, and a superficial wound may be safely treated by sutures.

Since the scar of the wound must be subjected to a good deal of strain as the uterus enlarges and during labour, a scar-hernia may result, and for this reason we think it best to supplement the three-tier method of uniting the abdominal parieties with through-and-through sutures.

Where the ovarian tumour has to be removed at or near term the question of delivering the child by Cæsarean section must be considered, to avoid the strain of labour on the abdominal scar and as an act of mercy to the woman. One of us lately carried out this proceeding, which we believe to be the proper one.

The removal of a broad-ligament ovarian tumour is a much more serious matter, since the dilated veins in the broad ligament may be wounded, and apart from this, the greater disturbance to the uterus necessary for the enucleation is more likely to bring on miscarriage or premature labour.

Exceptions to Removal of the Tumour.—If a small cyst well out of the pelvis is discovered shortly before labour, it may be left alone till the patient has convalesced from her labour.

If the distension due to the tumour is so marked that the patient is very ill from œdema of her lungs and other parts of her body, it will be safer to relieve the pressure by tapping the cyst, removing it later when her general condition has improved.

If on opening the abdominal cavity it is found that, owing to inflammation of the tumour, a large number of vascular adhesions have formed, the practitioner, unless extirpation of the mass is a necessity, should rest satisfied with tapping or draining it, since the hæmorrhage on an endeavour being made to separate the adhesions will be severe, the removal of the uterus may be necessitated, and in any event the pregnancy is likely to be terminated.

OVARIAN TUMOUR AND LABOUR.

Effect of Labour on the Ovarian Tumour.

The effect of labour on the tumour will depend partly upon the position of the tumour.

When the Tumour is above the Presenting Part.—Under these circumstances the tumour may be ruptured by the contractions of

the uterus, its pedicle may become twisted, or it may be crushed so that later it will inflame.

When the Tumour is below the Presenting Part.—The tumour may be ruptured by the pressure of the presenting part, or it may be crushed and later inflame, whilst if the child is expressed past it, the rapid release of the pressure may result in the tumour suddenly rising out of the pelvic cavity, and in the process twisting its pedicle.

On rare occasions ovarian tumours have been driven through the vaginal vault and expelled in front of the head of the child.

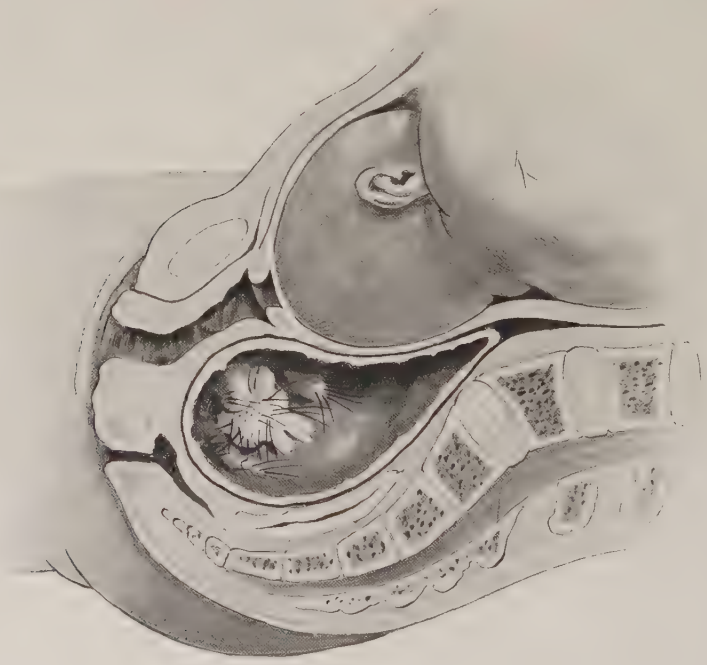


FIG. 30.—Ovarian Dermoid Cyst impacted in the pouch of Douglas under the Head.

A still rarer event is passage of the cyst into the rectum, as in a case lately seen by one of us, see p. 458.

Although the complications mentioned are liable to occur, nevertheless a woman has often passed safely through labour with an ovarian tumour.

Effect of the Ovarian Tumour on Labour.

When the Tumour is above the Presenting Part.—The tumour may cause malpresentation of the child.

The tumour may also be responsible for a certain increase in the length of the labour, by preventing the woman from using her diaphragm and abdominal muscles.

When the Tumour is below the Presenting Part.—In this case the tumour may cause acute obstruction leading to rupture of the uterus (Fig. 30).

TREATMENT.

When the Tumour is above the Presenting Part.—In such a case obstruction is not likely to result, and unless, therefore, any of the complications already mentioned arise, the removal of the tumour may be postponed to a more fitting opportunity.

When the Tumour is below the Presenting Part. — If skilled assistance is available the tumour should be removed through an abdominal incision, and after the tumour has been removed and when the cervix is well dilated, the child should forthwith be delivered by forceps to save the strain on the abdominal wound due to the "pains."

It occasionally happens that the tumour is so impacted in the pelvis that very great difficulty is found in releasing it. As a rule in these cases the tumour can be raised out of the pelvis by eventrating the uterus.

Very rarely when the tumour is fixed in the pelvic cavity by adhesions it may be impossible to remove it before the uterus is emptied; in which case, as in two instances we have knowledge of, Cæsarean section must be performed and the tumour then removed.

If skilled assistance is not available an attempt should be made, under an anæsthetic, to push the tumour out of the pelvis above the presenting part, and the child should then be delivered by forceps or by traction on the breech. If during such a manœuvre the cyst bursts, it should be removed as soon as arrangements can be made after the birth of the child. If the tumour cannot be thus elevated it should, if fluid, be incised per vaginam and the child delivered with forceps.

Since incising the cyst will result probably in some of its contents escaping into the peritoneal cavity, the practitioner should have the tumour removed as soon as possible after the delivery because of the risk of peritonitis.

If the tumour is solid craniotomy would have to be performed.

OVARIAN TUMOUR AND THE PUERPERIUM.

Effect of the Puerperium on the Ovarian Tumour.

Puerperal sepsis may lead to infection and suppuration of an ovarian tumour, as also may torsion of its pedicle.

Owing to the rapid decrease in size of the uterus during the first few days of the puerperium the pedicle of the tumour may become twisted, and the likelihood of this is increased owing to the lax abdominal walls and the mobility of the abdominal viscera.

Effect of the Ovarian Tumour on the Puerperium.

We have already noted that during labour and the puerperium the pedicle of the tumour may become twisted, that during labour the tumour may become ruptured or crushed, and as a consequence inflamed. Dermoid cysts, because they are so commonly found in the pelvis, are particularly prone to suppuration after labour. The signs and symptoms of puerpery complicated by an inflamed tumour are discussed on p. 520.

TREATMENT.

If the practitioner is aware that the patient has an ovarian tumour he should keep a sharp look out, during the days immediately following the labour, for any of the complications already noted, and should one of these arise the tumour must forthwith be removed. In the absence of such complications the removal of the tumour may be postponed till convalescence is established.

If a patient shows symptoms and signs of infection, especially of a character local to the pelvis, the practitioner must always remember that her condition may be due to some complication having arisen in an ovarian tumour, and should examine for such.

HYDATID CYSTS OF THE PELVIS.

Hydatid cysts of the pelvis complicating pregnancy may occur in the cellular tissue surrounding the vagina, rectum, uterus or tube, or in the broad ligament, or in the pelvic fascia.

In most cases the cyst is situated in the posterior part of the pelvis, close to the rectum, and it may be either primary in the pelvis or secondary to hydatid disease elsewhere. It often happens that the first effect noticed is obstruction to delivery.

RESULTS.

The cyst may obstruct labour, necessitating the use of forceps, craniotomy, embryotomy or Cæsarean section. It may rupture

during delivery when forceps are being used, or even by the pressure of the child during its birth.

The cyst frequently suppurates, the infection being due to tapping or secondary to puerperal sepsis, and the pus may escape through the uterus, bladder, rectum or vagina.

The complication is a grave one, 30 per cent. of reported cases being fatal, death being mostly due to infection and occasionally to a ruptured uterus or intestinal obstruction.

DIAGNOSIS.

As the disease is so rare in England, the chance of a cystic swelling in the pelvis being due to hydatid disease is very remote; such a cyst is generally mistaken for an ovarian tumour or a soft fibroid. An hydatid cyst will thus generally escape diagnosis unless it is associated with hydatid disease elsewhere, for instance, in the liver, in which case the presence of a cystic abdominal tumour apart from the pregnant uterus should certainly excite suspicion.

TREATMENT.

Rarely when the cyst has been attached to the omentum it has been found possible to push it up above the presenting part and deliver the child. The obstruction may be relieved by puncturing the cyst, by removing the cyst per vaginam, or best of all, by Cæsarean section and removal of the cyst per abdomen.

CHAPTER XV.

Affections of the Placenta, Membranes, and Decidua.

SPONTANEOUS RUPTURE OF THE MEMBRANES DURING PREGNANCY.

CAUSE.

Spontaneous rupture of the membranes may occur during pregnancy without any cause being detected; it also happens in cases of hydramnios, when it is probably due to the increased pressure. The perforation is as a rule very small, and the liquor amnii drains away slowly. Premature labour almost surely follows this accident, but is postponed from a few days to a few weeks, during which a more or less continuous loss of liquor amnii is going on.

In a few extremely rare cases that have been recorded the fœtus has escaped through a rent in the membranes and has undergone extra-chorial development.

SYMPTOMS AND SIGNS.

If the membranes have ruptured spontaneously the abdomen gradually becomes smaller, and labour supervenes. It sometimes happens that the membranes rupture away from the region of the cervical canal, a valve-like opening resulting, and the escape of liquor amnii is then very slow. In such a case the bag of membranes would appear at first intact.

The liquor amnii escaping can be identified by its chemical composition.

DIAGNOSIS.

When a pregnant woman complains of a watery discharge, the fluid may have escaped from the bladder, from the decidual glands, from a fluid collection between the chorion and amnium, or from the amniotic cavity.

Urine. The bladder should be examined to exclude incontinent overflow or paresis of the sphincter, and if there is still a doubt the fluid shall be examined chemically.

Hydrorrhœa Gravidarum. — In hydrorrhœa gravidarum the watery discharge escapes continually in gushes, and it is in the

latter case that it is most likely to be mistaken for an escape of the liquor amnii.

Such a condition is distinguished from premature rupture of the membranes because labour does not come on, neither does the abdomen get smaller ; the bag of membranes may also be felt intact.

Collection of Fluid between the Chorion and Amnion.—This is a rare condition which gives rise to a second bag of "waters." If the chorion ruptures, the fluid escapes and would thus simulate escape of the liquor amnii, but labour does not come on and the true bag of waters can be distinguished intact. In this condition, in contrast to hydrorrhœa gravidarum, there is one gush of fluid which is not repeated.

TREATMENT.

When the practitioner thinks that the membranes have ruptured prematurely, he should examine the fœtal heart frequently, and if it appears that the child is suffering from pressure, labour should be induced with a de Ribes' bag.

HYDRORRHŒA GRAVIDARUM.

CAUSE.

Hydrorrhœa gravidarum is usually stated to be due to the discharge from the glands of the decidua vera in the condition known as hypertrophic decidual endometritis. This disease, which is rare, is characterised by great overgrowth of the endometrium of the pregnant uterus, especially affecting its glandular elements.

Some cases of watery discharge of a pregnant uterus are due to a local perforation of the membranes. Napier Burnett has described one case in which this was due to infective necrosis.

SIGNS.

The discharge, which commences in the first half of pregnancy and continues till term, has the appearance and consistency of water. The flow of fluid may be continuous or intermittent, this latter phenomenon being due to the fact that it may be held up for a while in the uterus by some slight adhesion of the membranes or a plug of mucus in the cervical canal, till its pressure breaks through the obstruction.

The quantity of fluid discharged may amount to several ounces a day.

DIAGNOSIS.

When the discharge is noted at or about term it may be mistaken for liquor amnii which is escaping owing to premature rupture of the membranes, the escape of urine, or of an accumulation of fluid between the chorion and amnion. For the differential diagnosis between hydrorrhœa gravidarum and these other conditions the reader is referred to the diagnosis of premature rupture of the membranes.

TREATMENT.

There is no treatment for this condition.

HYDRAMNIOS.

A slight excess of liquor amnii is common, but a quantity sufficient to merit the term "hydramnios" is not often met with.

CAUSE.

Hydramnios probably owns many causes, both maternal and fœtal. It is associated rarely in the mother with ascites due to heart and kidney disease. The condition, however, most frequently affects one of twins, and in many instances fœtal deformities such as talipes and spina bifida are present. The child is often dead, and in 75 per cent. of the cases it is a female. For these reasons, and the fact that the mother is generally healthy, the disease is regarded as most often of fœtal origin.

VARIETIES.

Hydramnios is met with in two forms, an acute and chronic, of which the latter is by far the commoner.

SYMPTOMS.

Chronic hydramnios appears from the fifth month onward. The symptoms depend upon the rate at which the fluid is secreted, and comprise abdominal pain, breathlessness, and palpitation.

Acute hydramnios is most uncommon. We have seen one example of this rare condition in which the fluid was very rapidly secreted during the ninth month of gestation. The symptoms and signs are similar to those noted under chronic hydramnios; but there is a striking difference between the two, for whereas with chronic hydramnios the accumulation of fluid is so gradual that the patient can more or less tolerate the condition, in acute hydramnios the patient is greatly distressed. In our own case the dyspnœa was so bad that the patient was absolutely unable to breathe in the recumbent position.

SIGNS.

The uterus is much larger than it should be, so that at six months it may be as large as the normal organ at term (Fig. 31). A well-marked thrill can be obtained over it, and on palpation, if the gestation is single, no fœtal parts may be detectable. In the case

FIG. 31.—Hydramnios.

of twins the normal ovular sac usually occupies the upper pole of the uterus, and here over a limited area the fœtal parts and the fœtal heart may be unusually well felt and heard. Elsewhere the area of the abdomen is "silent."

On vaginal examination the head of the fœtus in the hydramniotic sac is not as a rule felt.

There may be marked œdema of the legs and vulva, and the urine may be diminished in quantity and may contain albumen.

EFFECTS.

Hydramnios tends to shorten pregnancy. At times it appears to be a factor in pernicious vomiting and eclampsia.

Hydramnios is a cause of premature rupture of the membranes, presentation and prolapse of the cord, abnormal presentations of the child, inertia of the uterus, and post-partum hæmorrhage.

After-pains and subinvolution are common in the puerperium.

DIAGNOSIS.

Hydramnios may simulate an ovarian cyst, an ovarian cyst complicating pregnancy, twins, ascites with pregnancy, and distension of the fœtal abdomen.

Ovarian Cyst.—An ovarian cyst is simulated on account of the general contour of the swelling, of the fluid thrill, and because a fœtus cannot be felt nor a fœtal heart heard. On the other hand, the fact that the patient has some of the signs of pregnancy, such as amenorrhœa, enlarged breasts, a fluid secretion in the breasts, softening of the cervix, blue coloration of the vulval and vaginal mucous membrane, and that on vaginal examination the lower pole of the swelling is continuous with the cervix, will suggest that the swelling is intra-uterine, whilst if the swelling can be felt to harden from time to time (intermittent contractions) all doubt is set at rest. It must be remembered that in some patients with ovarian tumours the breast will be found enlarged and secreting a fluid, the genital passage may be darker from pressure, and there may be a history of amenorrhœa. Auscultation in the case of hydramnios will reveal the uterine *souffle*.

Ovarian Cyst and Pregnancy.—A more difficult diagnosis at times is that from an ovarian cyst complicating pregnancy. In this case the condition may be thought to be due to hydramnios and twins, only one ovular sac being affected. In these cases it may be possible on careful examination to distingush the two swellings, or if the practitioner was palpating the abdomen during an intermittent uterine contraction, one part of the swelling might be felt to get harder whilst the consistency of the other did not alter.

Twins.—As already pointed out, twins are often associated with an amount of liquor greater than normal, or with an amount that can be dignified by the name of hydramnios, in which case the one child is usually dead. The diagnosis of a uterine swelling larger than normal merely from the presence of two or more

children would be made by noting that the fœtal parts are easily palpable, whereas in hydramnios they can scarcely be felt.

Ascites.—If a pregnant patient had advanced serious cardiac or renal trouble complicated with a considerable amount of ascitic fluid the abdomen would be markedly enlarged. The characteristic sign of ascites, viz., shifting dulness in the flanks, is present, while the fœtal parts will probably be distinctly palpable in front. It must be remembered that hydramnios at times coexists with ascites.

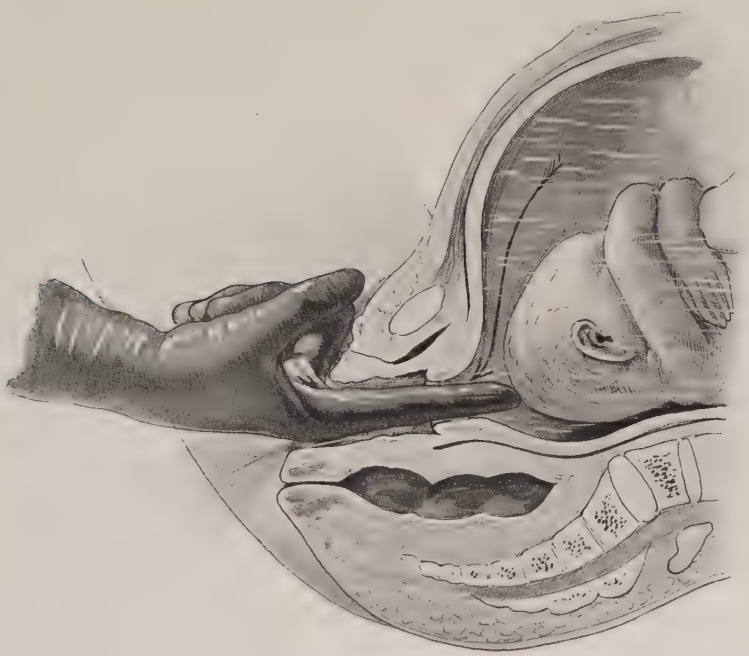


FIG. 32.—Hydramnios. Pushing the Head away from the Cervix to allow the Liquor Amnii to escape.

Distended Fœtal Abdomen.—This condition when marked is difficult to distinguish from hydramnios, but such of the fœtal parts as can be felt are more or less fixed, and the head can usually be palpated above the vaginal vault, whereas in hydramnios the opposite obtains.

TREATMENT.

In acute cases the uterus must be emptied at once. The best way to do this is to rupture the membranes, and when most of the liquor has drained away to insert a de Ribes' bag, dilating the cervix for this purpose if necessary. After the membranes are

ruptured, the head may come down like a ball-valve and prevent the liquor amnii from escaping. This should be prevented by pushing the head up with the finger (Fig. 32).

In chronic cases it may be sufficient to let the patient rest and wear an abdominal belt to take off the pressure. If relief is not obtained, labour must be induced by the method already described for the acute variety. If a living child can be detected but is not viable, the induction of labour should be postponed as long as possible.

OLIGAMNIOS.

CAUSE.

An abnormally small amount of liquor amnii is rare, and its cause is unknown.

SIGNS.

The fœtal parts and movements are felt and seen with unusual distinctness.

EFFECTS.

Almost complete absence of the liquor amnii leads early in pregnancy to the development of so-called "amniotic adhesions," bands stretching between the amnion and the fœtus. These bands are responsible for certain fœtal deformities, of which the so-called intra-uterine amputation of a limb or deep constrictions in it are the best known. Oligamnios arising later in pregnancy may be a cause of club-foot.

Labour is apt to be prolonged in the first stage, and the child is likely to suffer from the pressure.

DIAGNOSIS.

The ease with which the fœtus is felt may lead the practitioner to suspect extra-uterine pregnancy. All other signs of the latter condition are, however, absent.

TREATMENT.

If the first stage of labour is delayed, a de Ribes' bag should be inserted.

ABNORMALITIES OF THE PLACENTA.

The placenta is liable to various abnormalities of shape and size. It may be the seat of infarcts and tumours, it may be retained in or adherent to the uterus, or it may be the seat of hæmorrhage, inflammation, or œdema.

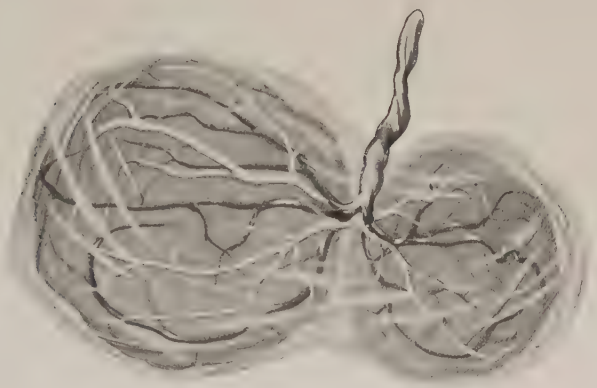


FIG. 33.—Lobate Placenta.

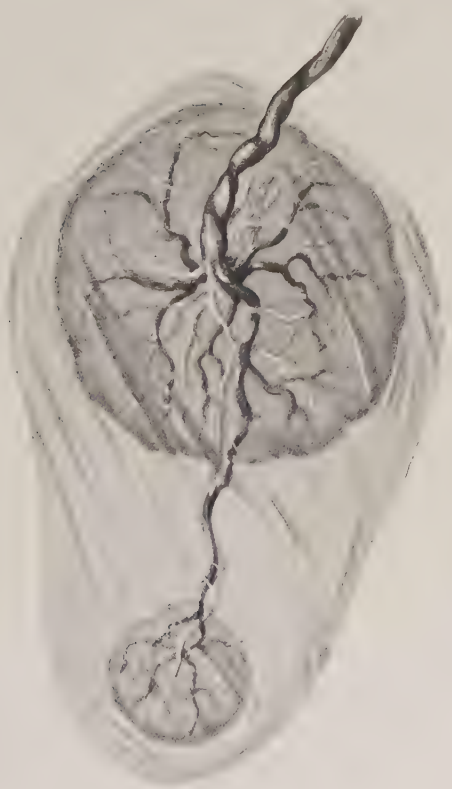


FIG. 34.—Succenturiate Placenta.

ABNORMAL SHAPE.

Lobate Placenta.

The placenta may be bilobed or trilobed. Such anomalies possess no clinical interest (Fig. 33).

Succenturiate Placenta.

A small isolated placenta connected to the main mass by a leash of vessels running across the chorion is an abnormality of

Fig. 35.—Velamentous Placenta.

importance because of the liability for the accessory placenta to be retained in the uterus unnoticed. Such an event may produce post-partum hæmorrhage, or may lead to sepsis (Fig. 34).

A retained succenturiate placenta is to be suspected when, on examining the afterbirth, a leash of vessels is found running across the chorion and terminating abruptly at the torn edge of the hole

which has resulted from this piece of placenta having remained adherent to the uterus.

In such an event the uterus should immediately be explored.

Velamentous Placenta.

In this condition the cord joins the amniotic sac outside the placental edge, the vessels breaking up and running sessile to it in

Fig. 36.—Battledore Placenta.

the substance of the membranes. It is of little importance, but cases are on record in which some of the vessels have torn across during delivery, and caused the death of the fœtus from hæmorrhage. Such vessels may be felt in front of the head before the rupture of the membranes. Spiegelberg advised rupturing the membranes artificially to one side of the vessels in such a case. H. Williamson

concludes that if the condition is discovered early in labour Cæsarean section gives the best chance of saving the child [1] (Fig. 35).

Collarette Placenta.

An abnormality in which the placental tissue overlaps the chorio-placental junction. It has no clinical interest.

Membranous Placenta.

The placenta may be unusually extensive and thin. The condition is best seen in tubo-ligamentary pregnancy, but may occur in intra-uterine gestation. Such a placenta is often morbidly adherent.

Battledore Placenta.

In this variety the cord is attached to the edge of the placenta (Fig. 36).

Abnormal Size.

An abnormally large placenta is seen with twins and monsters, and at times with hydramnios.

It also is said to occur in syphilis.

HÆMORRHAGE.

Retro-placental.

Hæmorrhage behind the chorion in the earlier months is the common determining cause of abortion, see p. 221.

Retro-placental hæmorrhage in the later months is considered elsewhere, see p. 245.

Intra-placental.

Hæmorrhage into the placenta is a rare occurrence, and when extensive results in the formation of the hæmatomole of Breus, see p. 236. In a lesser degree it is seen with albuminuria and other toxic conditions of pregnancy.

INFLAMMATION.

But little is known about this occurrence. Various degenerative conditions, fatty, cystic, calcareous, or fibrous, have been attributed to periarteritis of the placental vessels. Such states usually accompany conditions of maternal toxæmia, and result in the death of the fœtus when they are well marked.

The bacillus of tubercle has been recovered from the placenta, and definite tubercular lesions have been described.

[1] *British Journal of Obstetrics and Gynæcology*, 1912.

The placenta accompanying a fœtus born with syphilitic lesions upon it is usually large, diffusely thickened, and the seat of areas of fibro-fatty degeneration. On the other hand, the placenta of a child born to all appearance healthy but subsequently developing syphilitic lesions is apparently healthy as a rule.

Syphilitic arteritis of the placental vessels is the most marked histological finding in these placentæ, but cell masses resembling gummata are present in some cases.

INFARCTS.

Placentæ often exhibit several or many white patches which microscopically consist of villi in a state of necrobiotic degeneration. These patches are held to be due to thrombosis of some of the placental vessels. A few such infarcts are not uncommon in apparently normal cases.

In certain toxic states, particularly pregnancy albuminuria, they are very numerous, and are then associated with intra-uterine death of the fœtus.

TUMOURS.

Tumours of the placenta are very rare. The most important of them, chorio-carcinoma, is dealt with elsewhere, p. 193.

Angiomata, myxomata, and fibromata have been described.

Placental cysts are occasionally found. Most of them probably represent old placental hæmatomata.

Cysts of amniotic origin have been described, some of them dermoid in nature.

ŒDEMA.

Diffuse œdema of the placenta is met with in certain dropsical conditions of the mother, or may be associated with hydramnios and œdema or malformation of the fœtus. The latter is usually dead.

RETAINED PLACENTA.

As a rule a short time after the termination of the second stage of labour, contraction and retraction of the uterus recurs, and the placenta is separated and then expelled. On an average about twenty minutes ensues before this event; but patients vary, and it is not customary to regard the case as abnormal until an hour has elapsed since the birth of the child, unless indeed efforts have been made before this period has elapsed (and they generally have been) to manually express the afterbirth.

The placenta may be retained because it is morbidly adherent, or because the chorion will not separate. Hour-glass contraction of the uterus or inertia of this organ delays the expulsion, as does a cervical myoma or a full bladder.

TREATMENT.

Retention of the placenta must be treated according to its cause.

FIG. 37.—Introduction of the Hand into the Vagina.

If inertia of the uterus is the only cause, manual expression is the correct treatment.

ADHERENT PLACENTA.

CAUSE.

Morbid adhesion of the placenta may be due both to disease of it, or of the underlying decidua.

The degree and extent of morbid adhesion varies. It most

commonly affects only a portion of the area, rarely the whole of it. In extreme cases no plane of cleavage can be found between the placenta and uterine wall, and it is difficult to make out the boundaries of either.

RESULTS.

Complete morbid adhesion causes retention of the placenta, but without hæmorrhage.

Fig. 38.—Adherent Placenta. Manual Removal.

Partial adhesion results in post-partum hæmorrhage, the uterus being unable to retract and close the vessels over the area of separation.

Morbid adhesion may result in a portion of the placenta remaining adherent, the main bulk being expelled, and both on that account and because of the manipulation required to remove it, there is an increased liability to sepsis.

DIAGNOSIS.

Adherent placenta is diagnosed when the hand is passed into the uterus for the purposes of removing the placenta, nature and

abdominal compression of the uterus having failed to expel it. Adherent placenta may be suspected if the normal uterine contractions fail to separate it, or if there is an excessive loss after the birth of the child, more especially if the loss is coincident with the uterine contractions.

Adherent placenta may be expected if it has complicated a previous labour of the patient.

TREATMENT.

A morbidly adherent placenta must be removed. To perform this efficiently an anæsthetic is of great assistance, and should always be employed, except in urgency from post-partum hæmorrhage. Rubber gloves should, of course, be worn.

A placenta is best separated from above downwards by the right hand introduced cone-shaped into the vagina (Fig. 37) and then into the uterus, while the left hand makes counter pressure from the abdomen, the patient being on her back (Fig. 38). When the adhesion is very firm, removal of the placenta entire may be impossible. In such a case the utmost care should be taken to continue the manipulations until the uterus is completely empty.

The placenta removed, the uterine cavity should be washed out with a large quantity of a hot antiseptic solution, and if retraction is deficient ergotin should be administered.

ADHESION OF THE CHORION.

Morbid adhesion of the chorion is due to previous deciduitis. The placenta, having been separated, is held back either in the uterus or vagina according to how much of the chorion is adherent. Injudicious attempts to expel the afterbirth by forced compression, before the membranes have had time to separate normally, are liable to result in a portion of the chorion being retained.

RESULT.

Pieces of the chorion of varying size are apt to be retained, the tougher amnion coming away with the placenta when it is expelled or removed manually. The retained portion may cause hæmorrhage or be followed by septic infection.

DIAGNOSIS.

A diagnosis of adherent chorion may be made when the signs signifying separation of the placenta are present, and the placenta cannot be expelled by manual compression properly applied.

Retention of the chorion is recognised by inspection of the placenta and membranes after delivery.

TREATMENT.

Small pieces of chorion retained do not require removal so long as the uterus is well retracted and there is no undue hæmorrhage. Large portions should be removed by the fingers directly their retention in the uterus is recognised. It is a fact, however, that not

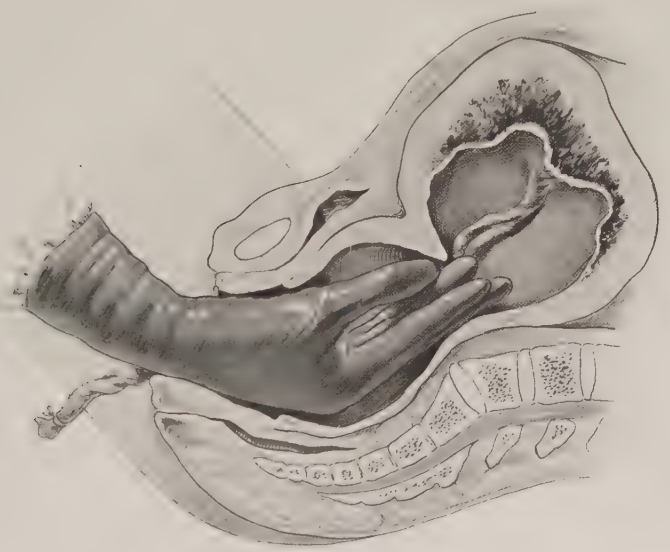


FIG. 39.—Hour-glass Contraction.

infrequently, although the entire chorion is missing, yet on exploring the uterus only a few inconsiderable fragments can be found.

HOUR-GLASS CONTRACTION.

CAUSE.

This complication is due to a spasm somewhere in the lower uterine segment, the upper segment being in a state of inertia. The cause of this spasm is not always apparent, but it most frequently follows a prolonged labour.

It has also been attributed to traction on the cord as a method of delivering the placenta, to an adherent placenta, and to intra-uterine manipulation. It is possible that in some cases the condition is really that of a contraction ring occurring before

delivery, see p. 314, the child being operatively extracted because of, but in ignorance of, that complication.

RESULT.

If the placenta is separated, but imprisoned above the contraction ring, serious bleeding may occur.

DIAGNOSIS.

The condition will be discovered when the hand is passed into the uterus to remove the placenta because of post-partum hæmorrhage, or because it has been retained beyond the normal period.

TREATMENT.

The treatment of hour-glass contraction of the uterus depends upon whether there is any urgency from hæmorrhage; if so, the right hand must be passed into the vagina and the fingers inserted into the contraction ring, which is then gradually dilated and the placenta removed (Fig. 39).

If there is no hæmorrhage, time may be given for the spasm to pass off, and in either case it may be necessary to administer an anæsthetic to relieve the spasm.

CHAPTER XVI.

Hæmorrhage.

MISCARRIAGE.

Under the head of miscarriage we include all cases in which a pregnancy is terminated prematurely before the child is viable, *i.e.*, before the seventh month.

The term "abortion" is sometimes applied to miscarriage occurring before the third month, but the word is an objectionable one.

CAUSES.

The causes of miscarriage are many, but may be grouped under the following heads:

Fœtal.

Diseases of Fœtus.—Syphilis; imperfect fertility; maldevelopment.

Diseases of the Umbilical Cord.—Knots; tumours.

Diseases of the Chorion.—Vesicular mole.

Overdistension of the Uterus.—Hydramnios; twins.

Maternal.

General.—**Poisons.**—Infectious diseases; diseases of the heart, lung, and kidney; syphilis, diabetes, malaria; carbonic acid; arsenic, lead, mercury, phosphorus.

Spasmodic Uterine Contractions.—Chorea; eclampsia; vomiting; epilepsy.

High Temperature.

Reflex Nervous Causes.—Excitement, worry, shock; operations; suckling.

Local.—**Pelvic Congestion.**—Endometritis; misplacement of the uterus, backwards and downwards; tumours of the uterus—cancer, fibroids; low implantation of the placenta.

Partial Separation of Membranes or Placenta.—Traumatic, blow, fall, shaking.

Exertion, dancing, riding, cycling, playing tennis or golf, working the sewing-machine.

Criminal, rupture of membranes.

Legitimate, dilatation of cervix, rupture of membranes.

Interference with Uterine Growth, incarcerated retroverted gravid uterus; adhesions from perimetritis; fibroid and ovarian tumours.

Oxytocics, ergot, quinine, aloes, juniper; digitalis, potassium permanganate, savin; pennyroyal, tansy, cantharides, black hellebore.

Irritable Uterus, "the habit of aborting."

Paternal.—Syphilis.

The causes of miscarriage bring about their effects in different ways as follows:

1. Disease or death of the child leads to degenerative change in the chorion or placenta.

2. Primary disease of the amnion, chorion, or decidua leads to hæmorrhage into them (blood mole), separation of them or death of the child.

3. Traumatism or interference with the growth of the uterus by separating some portion of the membranes or placenta leads to hæmorrhage, the formation of a blood mole, and death of the child.

4. Pelvic congestion causing hæmorrhage into or disease of the chorion, decidua, or placenta, giving rise to a blood mole or separation.

5. The poisons of the infectious fevers, malaria, mineral and gaseous poisons, act directly on the centre for uterine contraction, as also does high fever from any cause.

6. Fright, operations, and such like causes act reflexly on the centre for uterine contraction.

7. Certain diseases and drugs directly excite spasmodic contractions in the uterus.

Miscarriage is a very common event, and bears a ratio to normal births as 1 is to 5.

It occurs most often in the first three months, the third month being the most usual time, as diagnosed clinically; but there is no certainty as to this, since doubtless a large number of women miscarry in the first and second months, regarding the occurrence simply as a profuse period and seek no advice.

If the miscarriage occurs before the third month, the ovum is often expelled entire, as no placenta is formed. From the third month to the seventh there is much more likelihood of the placenta being retained owing to the separating or ampullary layer not being formed. It is therefore obvious that miscarriages between the third and seventh month are the most dangerous.

MECHANISM OF MISCARRIAGE.

A sudden shock or blow during the first three months of pregnancy may separate the villi from their attachment to the wall of the gestation sac, or the villi may become diseased and separate. As a result, the ovum dies and is subsequently expelled. A hæmorrhagic or a carneous mole may form before this occurs.

Though hæmorrhage during pregnancy is extremely suggestive of threatened miscarriage, yet it must be remembered that the blood may come from elsewhere than the site of attachment of the gestation. Thus, in the first three months before the gestation entirely fills the uterine cavity, irregular hæmorrhage, or even periodic losses, indistinguishable from those of menstrual origin, may take place from the decidua vera. Recurrent slight losses from the decidua vera are probably not uncommon, especially where endometritis has existed before pregnancy. This is the probable explanation of those cases in which recurrent or even continuous slight loss without other signs of threatened miscarriage characterises the first three months of pregnancy.

Again, the bleeding may come from the cervix, especially when this is the seat of chronic cervicitis and erosion, for the supervention of pregnancy increases the vascularity of the parts, and the tendency of some erosions to slight capillary oozing becomes exaggerated.

Finally, some neoplasm may be present, such as a mucous polypus or cervical carcinoma.

The diagnosis of threatened miscarriage should not, therefore, be made until after vaginal examination.

In the absence, then, of the causes suggested, and presuming the patient has incurred the risk of impregnation, miscarriage may be suspected if bleeding supervene after one or two periods have been missed, the patient having been regular before.

Further, if the periods have been regular, and then one comes on which is more profuse than the patient usually experiences, and if it is accompanied with some abdominal pain, miscarriage may also be suspected, for it must not be forgotten that the pregnancy may be so early that no period need have been missed. Proof of pregnancy in such cases is, of course, difficult.

The first point, therefore, to be decided is whether the patient is pregnant or not. In the early months this may be difficult, and depends chiefly upon an examination of the uterus.

The following points should be noticed:

1. The size of the uterus—enlarged.
2. The shape of the uterus—globular.
3. The consistency of the uterus—elastic, soft cervix.

4. Hegar's sign.

The symptom of morning sickness may also help.

In any particular case, however, during the early months of pregnancy, the signs and symptoms may not be very definite.

Extra-uterine gestation at times simulates abortion very closely, more especially when the decidua is expelled. The diagnosis may, therefore, not be definitely settled until the ovum can be felt by the finger through the dilated cervical canal, or until some substance has been passed and has been submitted to diagnosis.

The ovum feels tense, elastic, and has a convex surface towards the finger, whilst blood clot, with which it may be mistaken, is soft, non-elastic, and pointed.

Cases of incomplete abortion associated with offensive discharge and the presentation of membrane or placenta may be mistaken for a sloughing fibroid or malignant disease.

A membrane may be expelled from the genital passages during a miscarriage, in extra-uterine gestation or during menstruation.

	Miscarriage.	Extra Uterine Gestation.	Menstruation.
Shape . . .	Oval	Triangular	Triangular
Size	Larger	Larger	Normal
Decidual Cells . .	Yes	Yes	No
Chorionic Villi . .	Yes	No	No
External Appearance	Shaggy	Rough	Rough
Internal Appearance	Smooth	Pitted	Pitted

For the diagnosis of extra-uterine gestation see p. 559. In cases of membranous dysmenorrhœa, there is a history of a monthly expulsion of membrane.

Having diagnosed that the pregnancy is intra-uterine, the next point to determine is whether the miscarriage is "threatened" or "inevitable," and, if the latter, whether "complete" or "incomplete."

Threatened Miscarriage.

The following points must be noticed:

Bleeding.—This is intermittent in character and not sufficient to cause any marked symptoms of hæmorrhage. The blood is bright coloured, and, as a rule, there are no clots. Occasionally, however, a pregnant woman may bleed continuously for many weeks and yet carry the child to term.

Pain.—If present, only slight and irregular; may be absent.

Uterus.—This organ is soft, and the os is not dilated, or if so, only very slightly.

Inevitable Miscarriage.

Bleeding.—This is persistent in character, the amount of loss tends to increase until the ovum is expelled, and may be very serious, whilst clots are always passed. The bleeding may stop, but invariably comes on again.

Pain.—This is felt in the back and lower abdomen and gradually increases. It is intermittent in character, though it may be persistent if the uterine muscle is tonically contracted.

Uterus.—This organ may exhibit intermittent contractions. The cervical canal may be dilated so that the ovum can be felt, the liquor amnii may have escaped or pieces of the ovum may come away.

In cases of inevitable miscarriage it is not necessary that all the above signs should be present at the same time, but most of them are of sufficient importance to warrant a diagnosis that pregnancy will be shortly terminated. There have been some rare cases, however, where the patient has gone to term after the cervical canal has been dilated sufficiently to admit two fingers.

The practitioner, however, may not be summoned or may not arrive till "something" has been passed and the bleeding has lessened in amount, and then he has to determine the very important point as to whether the abortion has been complete or incomplete.

If possible, any substance which has been passed should be carefully examined by floating it out in water, when it may be that blood clot, the ovum, or membranes will be discovered. On the other hand, a careless nurse may have thrown away all that has been passed, or the result of the examination may be negative, in which case a diagnosis can only be arrived at after a pelvic examination and a consideration of the history.

Complete Miscarriage.

Bleeding.—The amount is very small, simply a slight loss, which, as with the lochia at full term, will continue for some days.

Pain.—There is no pain.

Uterus.—This organ is hard, the os is closed, and involution proceeds daily.

Incomplete Miscarriage.

Bleeding.—The amount varies, it is persistent in character, the colour may be that of chocolate, and the odour may be offensive.

Pain.—If it persists is intermittent in character, being due to uterine contraction. Continuous pain is probably due to septic infection.

Uterus.—This organ is soft, larger than it should be, is globular, and the os may admit the finger, when some substance can be felt.

Involution does not proceed properly; rarely the os is closed, and the bleeding may stop for some time.

TREATMENT.

Threatened Miscarriage.

A systematic examination should be made of the pelvic organs to ascertain if the uterus is misplaced or if there are any tumours interfering with its growth. A misplaced uterus should be replaced and a ring pessary inserted, see p. 173, while a tumour should be removed if thought advisable.

Rest.—The rest should be absolute, that is to say, the patient should be kept in bed in a recumbent position and the bed-pan used when necessary. The room should be quiet. In a town a quiet room may be difficult to obtain, and a room farthest away from the main street should be chosen. In some cases, where the patient is highly nervous and the expense can be incurred, straw in the street may be advisable. Friends should be prohibited, likewise the reading of letters or newspapers. The room may be darkened. If possible, a trained nurse should be in attendance, and failing this some sensible person who will be able to attend on the patient and prevent any exertion on her part.

Food.—This should be of a non-stimulating character, neither too hot nor too cold, and for the first two or three days a liquid diet will suffice. Alcohol should on no account be given.

Drugs.—Opium is the most useful drug we have for the purpose under discussion; it may be administered by means of a mixture, pills, or suppositories. The dose will vary according to the patient, the object in view being to administer sufficient to quiet the uterine contractions, and when that dose has been ascertained it may have to be given for several days.

The bromides of ammonium, potassium, or sodium may be given separately or combined in the usual doses, either alone, if the opium is not tolerated, or combined with the latter drug.

Vibernum Prunifolium is said to prevent uterine contraction, and the liquid extract may be given in association with opium, or alone.

Ergot, in 10 min. doses of the liquid extract, may be given three times a day, with or without opium, in those cases where hæmorrhage is the only symptom. It acts as a uterine tonic, causing it to retract down on to the separated area. This drug may also be used in most cases where the pain has stopped and the bleeding continues. When the pain is present ergot is not only useless, but likely to do harm, since pain signifies that the uterus is contracting.

The bowels should be kept acting with some gentle laxative, such

as confection of senna or liquorice powder, or enemata; the latter are perhaps less likely to disturb the uterus.

Inevitable Miscarriage.

The practitioner having arrived at the conclusion that miscarriage must take place, should treat the case like an ordinary labour, only interfering if

1. The ovum felt presenting in the cervical canal is delayed there.
2. The bleeding is serious.
3. Sepsis intervenes.
4. The miscarriage is incomplete.

Ovum Presenting but Delayed.—Remove forthwith as follows:

(*a*) The bladder and rectum must be emptied.

(*b*) Administer an anæsthetic.

(*c*) The operator washes his hands, makes them as aseptic as possible, and puts on sterilised indiarubber gloves.

(*d*) Wash the vulva well with soap and water, then swab with a solution of biniodide of mercury, 1 in 2,000.

(*e*) A vaginal douche, consisting of 2 quarts of biniodide of mercury, 1 in 2,000, at a temperature of 110° is given.

(*f*) The patient being on her back, in the lithotomy position, with thighs flexed, the operator with his left hand presses down the uterus through the abdominal wall, so as to be able to reach into the cavity with his right index finger, which he has meanwhile inserted into the vagina.

(*g*) The index finger of the right hand can now, as a rule, be passed through the cervical canal behind the ovum and up to the fundus, and the ovum is separated by the finger and extracted by forceps.

(*h*) After the uterus is emptied, an intra-uterine douche of 1 in 4,000 biniodide of mercury is given at a temperature of 115°, care being taken by pressure on the uterus to see that none of the douche is retained. If the bleeding continues after this, it may be necessary to plug the uterus with sterile gauze.

There may be certain difficulties in carrying out this treatment, because the operator cannot pass his finger above the ovum, especially if the uterus is retroverted.

If by the means indicated the index finger will not reach high enough, the hand, excluding or including the thumb, may be passed into the vagina. This may not be possible in primigravidæ, in which case a pair of sterilised ovum forceps may be passed gently up into the uterus and the ovum removed.

It often happens that if that portion of the ovum which is in

contact with the finger is removed, the uterus will quickly contract down and bring the remainder within reach.

If the uterus is turned backwards, counter pressure from the abdomen cannot be made until its position is righted. To do this, the hand must be passed into the vagina, after which the index finger is inserted into the cervical canal and the cervix drawn backwards, and when the fundus moves forward it is kept there by counter pressure of the left hand.

In those cases where a hand cannot be inserted into the vagina, a volsellum may be applied to the cervix, which is then drawn

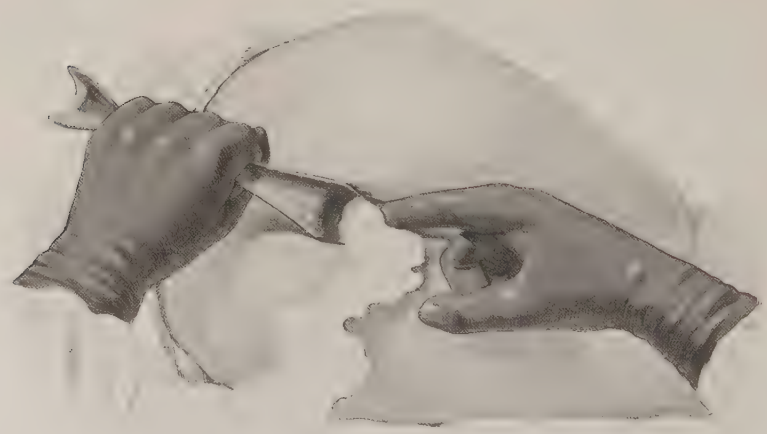


Fig. 40.—Plugging the Vagina.

down, and whilst the instrument is held in position by an assistant, the operator passes his index finger into the canal.

It is better to avoid the use of the volsellum however, if possible, especially in cases of sepsis, because of the necessary wounds attending its use. A "ring" forceps is a better instrument.

Serious Bleeding or Sepsis.—The treatment of these complications depends upon whether the cervical canal is sufficiently dilated to admit the finger. If it is, the ovum should be removed in the manner described under the last section, only in this case, as the ovum will not be separated, or only partly so, care will have to be taken to completely separate it from the uterine wall with the finger.

If the cervix is not dilated, the choice of a method of treatment

will depend upon whether interference is necessitated on account of hæmorrhage or of sepsis. The methods available are:

1. Plugging the vagina and cervix.
2. Rapid dilatation of cervix.

Plugging Vagina and Cervix.—*In the absence of sepsis* this is

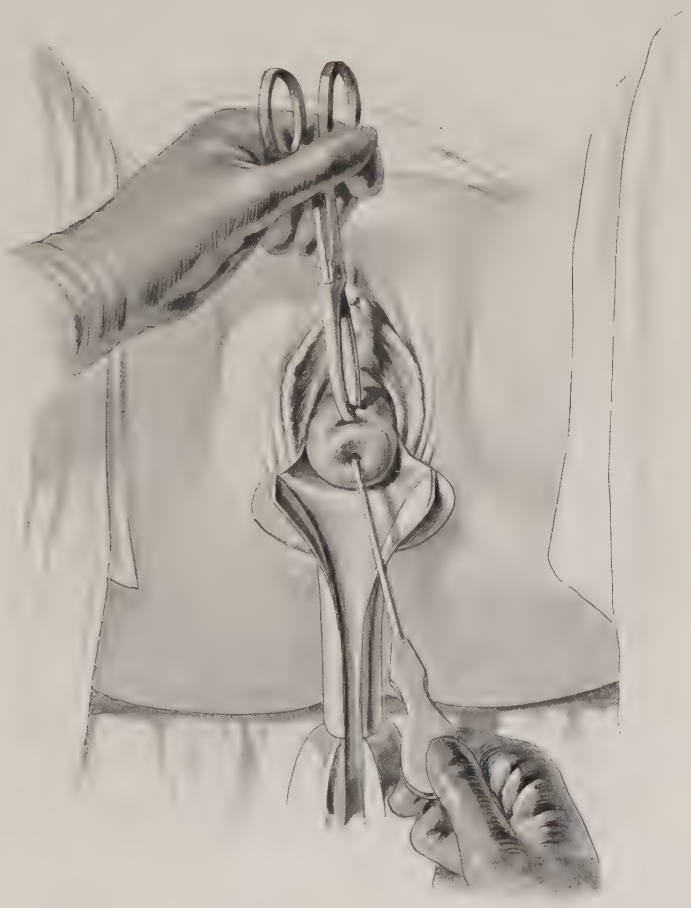


FIG. 41.—Removal of Retained Products. Ascertaining the Length and Direction of the Uterine Cavity.

certainly the safest and best method to adopt for anyone not skilled in operative gynæcology. Any material, so long as it is soft and sterile, may be used to plug: the best is gauze impregnated with mercury, iodoform, carbolic acid, or plain. In the absence of these linen torn up into strips and boiled for a few minutes or soaked in

a solution of 1 in 1,000 biniodide of mercury. The material should be 2 in. broad and 2 yards long. A Sims' speculum having been inserted, one end of the material selected is passed up by the fingers into the vaginal vault, and the posterior fornix is then gradually filled, after which the anterior fornix and lateral fornices, so that

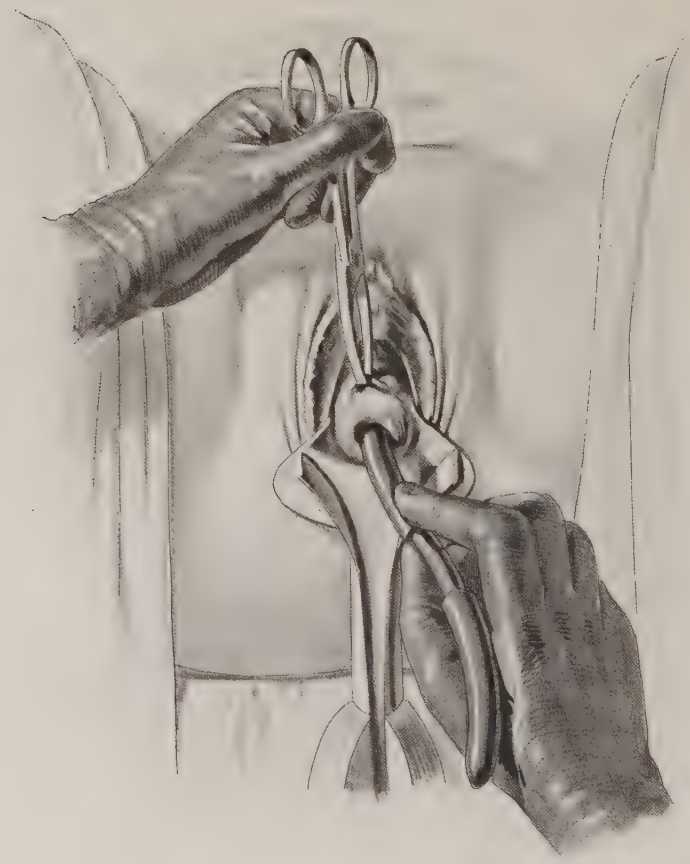


FIG. 42.—Dilating the Cervical Canal.

the cervix is surrounded; lastly, the remainder of the vaginal canal is packed tightly (Fig. 40). After the packing is finished a pad of wool and a T bandage is applied to keep up the pressure. The bladder must be emptied before the vagina is plugged.

Rapid Dilation of the Cervix.—By this is meant dilating the cervical canal by means of graduated dilators passed successively

until the required amount of dilatation is completed. This method is indicated under the following conditions:

1. When sepsis is present.

2. As an alternative to vaginal plugging when the requisites for a surgical operation are at hand.

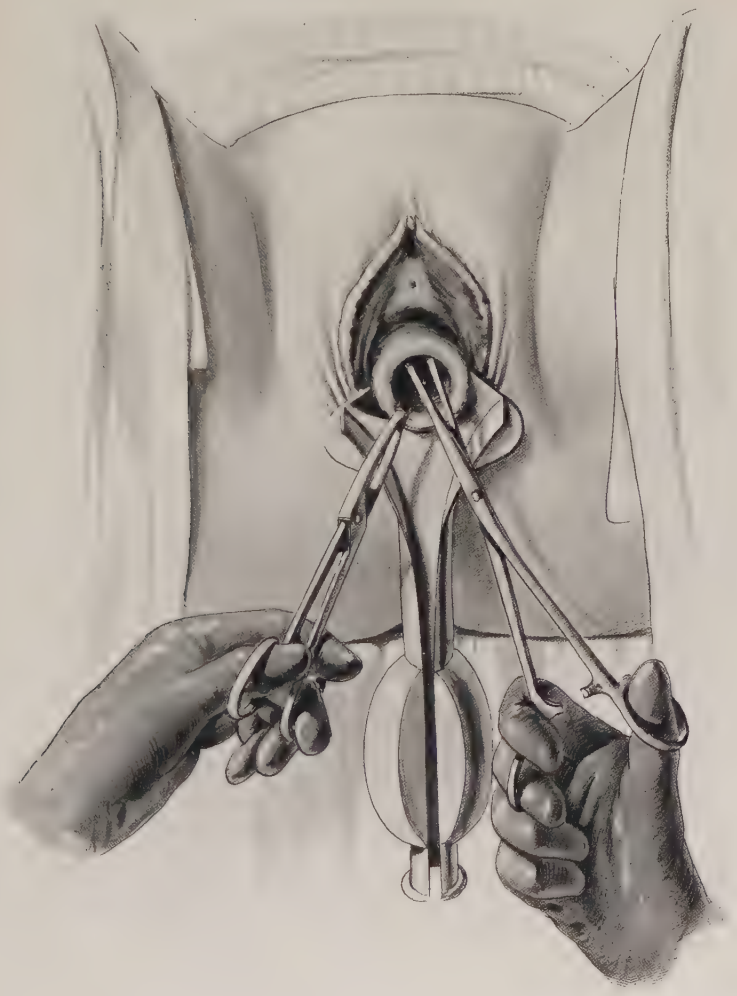


FIG. 43.—Removal of the Ovum with Forceps.

3. When the plug has not effected delivery in twenty-four hours.

4. In incomplete miscarriage, see p. 232.

METHOD.—(*a*) Empty the bladder and rectum.

(*b*) Anæsthetise patient.

(*c*) Operator washes his hands and puts on sterilised gloves.

(*d*) Place patient in dorsal position across bed so that buttocks reach over the edge, and get someone to hold the legs. Of course it is much better to place the patient on a table and have a Clover's crutch to keep the legs in position. In either case a mackintosh

FIG. 44.—Exploration of the Uterus. The Intra-uterine Douche.

should be arranged so that the buttocks are resting on one end and the other drops into a pail or footbath.

(*e*) Wash the vulva with soap and water, and afterwards swab with 1 in 1,000 biniodide of mercury.

(*f*) Vaginal douche, 1 in 2,000, temperature 110°, quantity 2 quarts.

(*g*) Insert a sterilised Sims' or Auvard's speculum into the vagina. Auvard's is the best, because no assistance is required.

(*h*) Fix the cervix with a volsellum; or, better, with two, on the anterior and posterior lips.

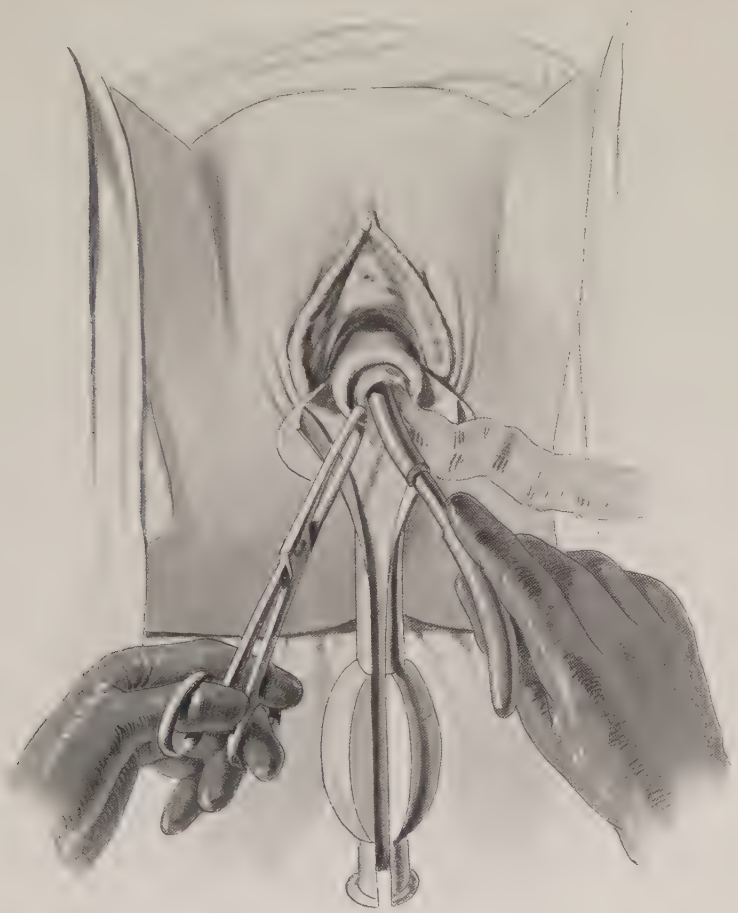


Fig. 45.—Packing the Uterus with Sterilised Gauze.

(*i*) Pass the sound to see the length and direction of the uterus (Fig. 41).

(*j*) Pass the graduated dilators carefully till the canal is large enough to admit the index finger (Fig. 42).

(*k*) Clear out the contents in the manner described (Fig. 43).

(*l*) Give an intra-uterine douche, 1 in 4,000, temperature 115° (Fig. 44).

(*m*) If there is much bleeding the uterus should be plugged with gauze (Fig. 45), or otherwise tampons of wool or gauze should be placed in the vagina.

Incomplete Miscarriage.—If any part of the ovum has been left behind, either from failure of nature's efforts or from the

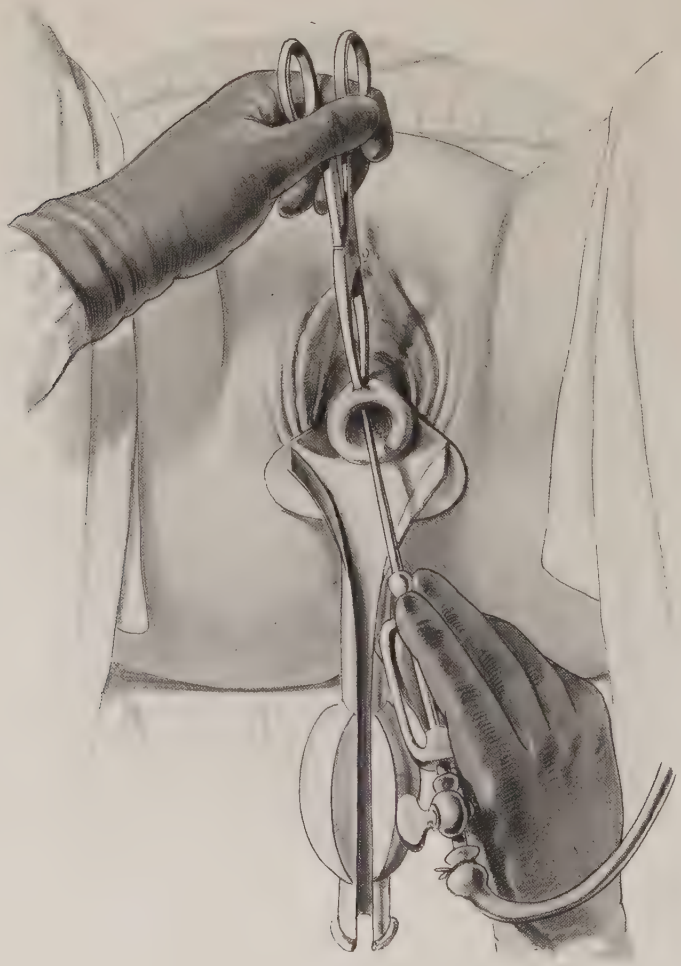


FIG. 46.—Curetting the Uterus.

incomplete performance of operative evacuation on the part of the a tendant, the following results may ensue:

1. The bleeding will probably continue.
2. Serious septic infection of the uterus is very likely to occur.
3. The uterus may retract down on the piece remaining, and for

the time being nothing may occur, but later hæmorrhage will supervene.

4. The piece may have fibrin deposited upon it, and eventually a placental polypus is formed, causing continuous bleeding.

For these reasons the only proper treatment in a case of incomplete abortion is to *clear out what is left at the earliest opportunity.*

If the canal is sufficiently dilated, the finger may be passed in and the piece removed: if not, the canal must be dilated first. These operations have already been described, pp. 225 and 229.

To Curette or Not. —We are strongly against using the curette in septic cases, as there are dangers associated with the use of this instrument which are peculiar when used for this complication. They are:

1. Perforation of the uterus, because this organ is likely to be much softer than usual.

2. Increasing the septic condition by opening up so many lymph channels. Indeed, many lives have been lost for this reason after curetting for an incomplete septic abortion, and, short of death, cellulitis, peritonitis, and pelvic abscess are rendered more likely.

Fig. 47.—Normal Early Ovum.

On the other hand, we think it better to use a blunt flushing-curette in cases were sepsis is absent, since by its means one may be more certain that every particle is removed and the risk of endometritis later is lessened (Fig. 46).

If in incomplete abortion there is any difficulty in removing the retained substance with the finger it can generally be managed with ovum forceps.

In some cases of septic abortion cellulitis or peritonitis is dis-

covered on pelvic examination. It may be difficult under these circumstances to decide whether the uterus should be explored or not.

If the canal has closed and there is no offensive discharge, it is safest not to interfere, on the assumption that there is nothing retained.

If the canal is dilated and there is a discharge the uterus should be explored.

FIG. 48.—Ovum extracted with the Decidua Capsularis still attached.

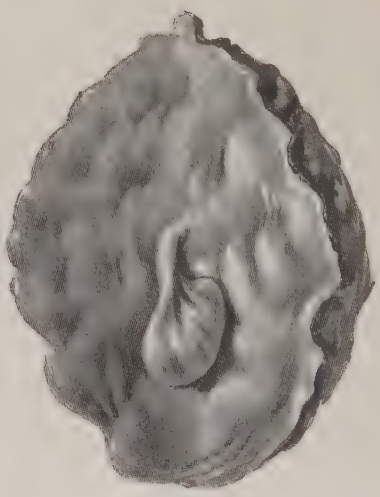


FIG. 49.—Blighted Ovum.

THE PRODUCTS OF ABORTION.

In abortion the character of the expelled contents of the uterus varies in different cases as follows:

Normal Ovum.

In some cases the healthy ovum is expelled.

In such the abortion is probably determined by some abnormal contraction of the uterus. The appearance of a normal ovum is shown in Fig. 47. Occasionally its lower pole is found to be covered by the still attached decidua capsularis (Fig. 48).

Blighted Ovum.

The ovum may be expelled apparently perfect, but when the

amniotic sac is opened it is found that the fœtus is represented by an amorphous mass, Fig. 49. In such cases the non-development of the fœtus is the probable cause of the abortion.

DECIDUAL CAST.

Occasionally in a very early abortion the uterus expels not only the gestation but the whole uterine decidua *en masse* in the form of a cast. Such a cast has the same general character as that passed in extra-uterine gestation, that is to say, it is roughly triangular in shape and its size equals that of the cavity of the uterus. It is rough on its outer surface and has three apertures. On opening it, however, it will be found to differ in this particular, namely, that its inner surface is raised in a series of purplish round elevations, whereas that due to extra-uterine pregnancy is much smoother and paler.

Careful microscopic examination may show besides decidual cells the early ovum embedded in the decidua (Fig. 50).

FIG. 50.—Decidual Cast imbedded, in which is a very early Gestation.

Blood Mole.

Blood moles always occur before the third month.

Any disease that will affect the decidua or chorion or any trauma that causes separation of these will cause a blood mole.

Perhaps the commonest condition causing the blood mole is chronic endometritis, the ovum grafting on tissues already unhealthy.

A blood mole consists of a cast in blood clot of the gestation sac in which the ovum lay. Embedded in this mass and more or less compressed lies the ovum. The villi are scarcely distinguishable from the clot that surrounds them, but can be demonstrated by the microscope. The amnion is intact and the amniotic fluid may be clear or turbid according to the length of time that the mole has been retained in the uterus after its formation. In blood moles of

less than four weeks' gestation, the fœtus is often macerated and disintegrated in the liquour amnii, but in other cases it will be found but softened and of a brown-red colour.

A blood mole is formed by the escape of maternal blood into the gestation sac. The sac distends under the pressure, and the villi being inelastic are torn away from their attachment to its wall, with the result that the ovum dies. The blood clotting in the gestation sac forms a mass, which when the decidua capsularis (reflexa) subsequently gives way, is extruded into the uterine cavity and from thence out of the uterus. A portion of the decidua capsularis often comes away attached to the surface of the mole (Fig. 51).

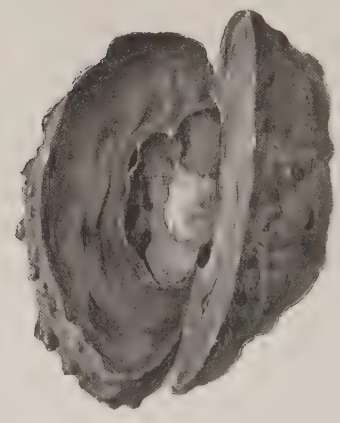


Fig. 51.—Blood Mole.

SYMPTOMS AND SIGNS.

The symptoms of pregnancy will cease or will not appear on the death of the ovum, so that sickness, if present, will stop, and the patient will think the child is dead because her abdomen is not getting any larger and she cannot feel any fœtal movements.

The signs that should correspond to the period of pregnancy are absent; thus there are no signs of fœtal life, the breasts get smaller. The uterus on bimanual examination is not as large as it should be and is much harder owing to the disappearance of the liquid amnii. There may be amenorrhœa up to the time the ovum is about to be expelled. In other cases a slight brownish discharge, intermittent or continuous, is noticed for some week or two beforehand.

Hæmatomole of Breus.

A rare and interesting variety of mole, first described by Breus, is occasionally met with. It consists of a large mass of placental tissue, the amniotic surface of which is raised in numerous bossy projections containing a serous blood-stained fluid. Though the mass may be as large as the placenta at term, the fœtus is either absent or is representated by a small rudiment. Such moles appear to be nearly always retained in the uterus till term, amenorrhœa continuing all the time (Fig. 52).

Carneous Mole.

This term is applied to a blood mole when it has been retained for several months in the uterus. The blood clot becomes consolidated and decolourised, so that on first inspection the mass does not suggest the products of gestation. On incising it, however, the amniotic cavity will be found much compressed and containing a grumous, brownish fluid, with or without a fœtus (Fig. 53).

Fig. 52.—Hæmatomole of Breus.

SYMPTOMS AND SIGNS.

The symptoms and signs are those of a blood mole except of a much longer duration.

A carneous mole may be retained till term, and throughout the whole period that elapses between the death of the ovum and the expulsion of the uterus menstruation is absent, though in many cases there may be a brownish discharge.

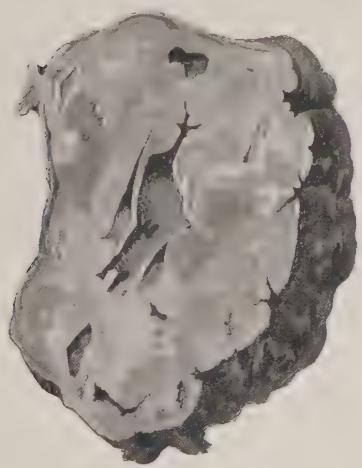


Fig. 53.—Carneous Mole.

DIAGNOSIS OF BLOOD OR CARNEOUS MOLE.

The cardinal feature of a blood or carneous mole is the presence of a uterus not sufficiently enlarged to correspond with the period of amenorrhœa.

In comparing the size of a pregnant uterus with the duration of pregnancy as estimated from the cessation of the periods, it is important to recollect that there is always a possible error of three weeks, for conception may have occurred immediately after the menstrual period that last appeared or just before the next one that was due.

The formation of a blood or carneous mole is, as has been stated, associated with the disappearance of many of the symptoms and signs of pregnancy.

On occasions immediate diagnosis is very difficult or impossible, as, for instance, when a patient becomes pregnant during a period of amenorrhœa and then has a threatened miscarriage, for on the examination necessitated by the hæmorrhage the uterus would be found smaller than the amenorrhœa warranted.

In many cases the diagnosis can only be made by waiting a month and noting if the uterus enlarges. Abderhalden's test should be applied.

TREATMENT OF BLOOD OR CARNEOUS MOLE.

The practical outcome of the foregoing considerations is this, that the practitioner should never be in a hurry to empty the uterus on the assumption that the fœtus is dead. In most of these cases there is no urgency, and active interference can very well be postponed until such time as the diagnosis is certain.

As a matter of fact, blood moles and particularly carneous moles are usually eventually expelled not only easily, but rarely associated with symptoms and signs of post-abortional sepsis, provided that they have not been tampered with. Nevertheless, when the fact that the ovum is dead is no longer in doubt, it is better to remove it and relieve the patient of further trouble and anxiety.

If the discharge becomes offensive or other untoward signs appear, the uterus must be immediately emptied.

The operation is carried out in the manner described on p. 229. Instrumental dilatation of the cervix is necessary in all these cases.

Vesicular Mole.

The cause of this remarkable formation is unknown. It is a disease initiated in the earliest stages of the growth of the ovum, and it is rare to be able to discover any trace of a fœtal rudiment.

That the disease has a fœtal origin is evidenced by the fact that it sometimes occurs in twins and only one ovum is affected.

Microscopically an œdematous degeneration of the mesoblastic core of the villi is present, which at intervals becomes cystic, thus producing the typical appearance of the mole. The epithelium of the villi may be normal or even thinned, especially where it covers the cysts; but in some vesicular moles very abnormal proliferation is noticed, associated with signs of increased destructive power on

the part of the trophoblast cells present in the wall of the gestation sac.

This is the malignant type of vesicular mole in which erosion of the maternal tissues by the overactive trophoblast may proceed, even to perforation of the uterine wall into the peritoneum.

Occasionally actual metastases occur, the growth finding its way into the large veins of the uterus, and from thence being transported to the lungs and other distant parts. The secondary nodules may show structures identical with the vesicular villi in the uterus, but more often they exhibit the formation typical of chorio-carcinoma, see p. 193.

Quite apart from immediate transformation of a vesicular mole into chorio-carcinoma, this peculiarly virulent form of malignant disease is relatively far more often a sequela of vesicular mole whatever its type than of normal pregnancy.

The course of vesicular mole is characterised by hæmorrhage sometimes beginning shortly after conception, but more often after the lapse of a month or so from that event. The natural termination of most vesicular moles is to be spontaneously extruded before the sixth month of pregnancy.

SYMPTOMS.

The patient will complain of a blood-stained discharge appearing as a rule in the first two months of pregnancy. The amount of blood lost varies; it may be slight or it may be severe enough to cause marked symptoms of hæmorrhage.

Owing to the rapid enlargement of the uterus which is sometimes present, the patient may complain of abnormal pain, and there may be nausea or sickness of a severe type.

SIGNS.

The chief signs of this disease are enlargement of the uterus, alteration in its consistency, and the presence of vesicles in the discharge (Fig. 54).

Enlargement of the Uterus.—The uterus may enlarge rapidly, so that by the third month of pregnancy it may be as large as the sixth. It has been shown by Briggs, however, that abnormal rate of enlargement is not characteristic of all vesicular moles, some of them being no larger or even smaller than a normal gestation of corresponding age. The uterus may be very tender and painful, but in other cases the reverse holds.

Alteration in its Consistency.—Instead of the normal elastic feel of the pregnant uterus, there is one of a doughy nature due to the growth filling the uterus and the absence of liquor amnii.

Vesicles.—Vesicles may be occasionally expelled in the discharge. When found they are white, transparent, and have been likened to white currants.

DIAGNOSIS.

In the absence of intra-uterine examination, the diagnosis can only be made with certainty if any of the vesicles are expelled. It is so very rare for this to happen that a diagnosis has, as a rule, to be arrived at in some other way.

Owing to the abnormal size of the uterus sometimes present in these cases, vesicular mole frequently has to be diagnosed from

Fig. 54.—Vesicular Degeneration of the Chorionic Villi.

hæmorrhage associated with pregnancy of a more advanced duration.

Thus, supposing a patient menstruated the first three months of pregnancy, had no loss in the fourth month, and had a threatened miscarriage in the fifth month, she would probably state that she was two months pregnant. An examination of the uterus would, however, reveal that it reached nearly up to the umbilicus. The practitioner under these circumstances might think of vesicular mole; but an examination would disclose other signs of pregnancy, such as the fœtal heart, fœtal movements, fœtal parts, or ballottement.

In vesicular mole there is (with the rare exception of twins or of

the disease only affecting a small portion of the placenta after the third month) no sign of a fœtus.

Accidental separation of the placenta may be simulated by vesicular mole with bleeding into the uterus. The patient may then have the most marked symptoms and signs of internal hæmorrhage, with only a blood-stained discharge or no discharge at all, as in a case we once saw. The diagnosis may be very difficult, but in vesicular mole all signs of the fœtus are absent, whereas in accidental hæmorrhage the presenting part will be felt.

Vesicular mole might be mistaken for placenta prævia, when there is hæmorrhage, and an examination discloses a soft mass in the region of the cervix. Such an examination, however, would at once bring away some of the vesicles, which would settle the diagnosis, in addition to which there would be no signs of the fœtus. It may also be mistaken for a rapidly growing fibroid or other intra-uterine tumour. Abderhalden's test should be applied in all these doubtful cases.

PROGNOSIS.

Vesicular mole is a serious condition, inasmuch as :

1. The mother may die from hæmorrhage.
2. She may die from perforation of the uterus and peritonitis.
3. She may die from sepsis due to retained vesicles.
4. She may die later from chorio-carcinoma.
5. She may subsequently suffer from hæmorrhage from a retained portion of the mole.

TREATMENT.

Directly the disease is diagnosed, the uterus should be emptied.

The patient should be examined from time to time for a few months after the uterus is evacuated, and if she has any abnormal bleeding the uterus should be explored, as the loss may be due to a retained portion of the mole or to commencing chorio-carcinoma.

Points in Emptying the Uterus.—This operation is carried out in the same way and with the same precautions as already mentioned on p. 229.

The practitioner must remember that there is likely to be severe hæmorrhage and that the uterus is soft.

Before the operator commences, give an injection of ergot. Having dilated the cervix, empty the uterus as quickly as possible with the fingers; the hæmorrhage will not cease till most of the mole is removed. If the finger cannot reach to the top of the uterus, ovum forceps must be used, but, as the evacuation proceeds and

the uterus retracts down, the finger will be able to explore the whole cavity.

If the bleeding still continues after the mole is removed, give a hot intra-uterine douche and pack the cavity with gauze if necessary.

The practitioner must be very careful not to use his fingers too forcibly. The uterine wall in these cases is often very soft from the vesicles having partly penetrated the wall. The use of the curette is contra-indicated for this reason.

Prophylaxis of Miscarriage.

A woman who has once miscarried is more susceptible to this complication than one who has not, and the more often the uterus is thus prematurely emptied the greater will be the risk of the next pregnancy being untimely terminated.

This "habit of abortion" is a difficult occurrence to arrest, so that if a woman has once miscarried every effort must be made to prevent such a result should a further pregnancy ensue. This "habit of abortion" has in the first place at any rate some definite cause, although this may not be apparent; whenever, therefore, a practitioner is summoned to attend a miscarriage he must take every opportunity of endeavouring to ascertain the cause of this complication, so that by appropriate treatment he may perhaps be able to prevent its recurrence.

To this effect the ovum should be carefully preserved, since a macroscopical or microscopical examination of the placenta, membranes or fœtus may disclose the cause. A reference to the list given on p. 219 will indicate to the practitioner the lines on which his investigations should be conducted.

It may be, however, that the patient does not consult her doctor until she has recovered from the miscarriage, or until she is again pregnant, in which case any information that might have been obtained from an examination of the ovum will not be available. The most probable cause of a miscarriage in the earlier months is a backward displacement of the uterus, in the later months syphilis, whilst the least probable cause is the "habit of aborting," due to an irritable uterus, for in most cases of repeated miscarriage, if a syphilitic taint cannot be detected, endometritis can.

Whenever, therefore, an obvious cause for the miscarriage cannot be detected by the usual methods of examination, the practitioner should have the husband, and wife if necessary, tested for the Wasserman reaction, since the husband if he has had syphilis may have thought he was cured and may not care to own having acquired it, whilst the primary sore of syphilis in a woman at

times gives rise to so few symptoms that she may be unaware of the fact that she has ever contracted the disease. A cause having been discovered, its appropriate treatment will be found discussed in text-books of medicine or surgery or under the appropriate headings in this work.

In addition, certain definite instructions should be given to a woman who has once miscarried and is again pregnant. Such a one should pursue a quiet life, should avoid long or fatiguing journeys on land, and if she is liable to mal de mer, sea voyages unless absolutely necessary must be prohibited. With certain reservations to be made later, she may take gentle exercise, but should avoid all games, the use of the sewing machine, dancing and riding, whilst driving over rough roads where jolting would necessarily result and fast motoring even on smooth roads must be strictly forbidden.

All sources of anxiety and excitement should be, where possible, avoided, including coitus, more especially in the earlier months; constipation, which involves a certain amount of straining, must be efficiently treated, and the diet should be of a non-stimulating character.

Further, the patient may be sent to bed a few days before her period would have been due had she not been pregnant, and kept there for a few days after it would have ceased, since it is found that a miscarriage is more likely to occur at these times than at others.

If in spite of all this care a miscarriage ensues and no adequate cause can be discovered, the uterus should be curetted and pregnancy avoided for some months to allow time for the uterus to become again healthy, since in most cases where the cause is not discoverable, endometritis will probably be the *fons et origo malorum*.

Lastly, we are left with those rare cases of irritable uterus where, because the uterus has one or more times been prematurely emptied, it may be from some disease which is no longer present, it refuses to be dilated beyond a certain size and contracting expels its contents. For such a condition rest during the whole of pregnancy may be prescribed, the patient being put to bed directly she is found to be pregnant. We have successfully treated such a case in this way; her general health was preserved by gentle massage, and the monotony of being bed-ridden in one room was obviated by having the bedroom on the ground floor, and providing a suitable couch, the same length as the bed, into which the patient was lifted during the day and then wheeled to another room or into the garden when the weather permitted.

In such cases also it would be judicious to prescribe sedatives if the patient was at all excitable, and a course of bromides over the time the period would have appeared and about the time the miscarriage usually ensues may be useful. In a similar way Viburnum prunifolium, in doses of 30 minims or 2 grains of the extract, may be administered, and this drug may also be combined with a sedative, given in small doses throughout pregnancy. The administration of chlorate of potash, as advocated by certain authorities, in 10-gr. doses three times a day, has been successful on several occasions in our practice. The drug should be taken throughout the pregnancy until viability is reached.

PROGNOSIS OF MISCARRIAGE.

The prognosis of miscarriage depends upon its cause. As a rule, unless it be a septic one, the immediate result is satisfactory, death being rare.

Septic cases are, however, a distinct menace to life, or escaping this, many a woman has only recovered with her health permantly impaired, or has later had to submit to some serious operation for inflammatory disease of the tubes or ovaries.

It therefore obtains that the results of miscarriage criminally induced by herself or others are much more serious, since in either case she is unlikely to seek advice unless or until the symptoms become pressing, and most of the deaths and invalidism are accounted for in this way.

AFTER-TREATMENT OF MISCARRIAGE.

The after-treatment of miscarriage is most important. Whereas nearly all patients keep quiet in bed for the first ten days or more of the physiological process of the puerperium, many neglect the pathological condition of a miscarriage and rise as soon as they possibly can, sometimes not even keeping to their bed at all. Experience shows that such customs are really topsy-turvy in their utility, for whereas a woman may very well to her advantage move freely about in bed the day following labour and get up after a few days, most of the evil effects of miscarriages are due to early rising and the careless manner in which women treat this complication. The practitioner should insist, therefore, that the patient keeps to her bed until such time as he thinks it fit for her to rise, that is, until any further complication has subsided and the bleeding has ceased for a week. Meanwhile she should be put upon a course of ergot and hot douching to aid the involution of the uterus.

CHAPTER XVII.

Hæmorrhage (*continued*).

ACCIDENTAL HÆMORRHAGE.

Accidental hæmorrhage is defined as bleeding due to the accidental separation of a normally situated placenta, the child

Fig. 55.—Concealed Accidental Hæmorrhage.

being viable. When severe it is one of the most serious emergencies which can confront the obstetrician, and the more so because it is often difficult to determine the best course of treatment.

CAUSES.

In many cases the bleeding comes on spontaneously, and is due to some disease of the decidua. For this reason it is far commoner in multigravidæ.

In other cases there is a history of shock or trauma preceding the hæmorrhage, but in most of these the placental attachment was probably already insecure. The onset of the hæmorrhage, as a rule, bears no relation to labour, many of the cases occurring during the seventh or eighth month, but occasionally it is coincident with the first stage.

VARIETIES.

The separation of the placenta is followed by retro-placental bleeding, which at first accumulates between the membranes and the uterine wall. As more blood is effused, it makes its way downwards towards the cervix, and, as a rule, eventually escapes, constituting "*revealed hæmorrhage.*"

Before this event has happened, however, a large quantity of blood has accumulated in the uterus, which tends to separate the placenta still further, until, in bad cases, it may be entirely detached from the uterine wall. Very occasionally it has been forced into the lower segment and expelled before the child. It is comparatively rare for absolutely no blood to find its way to the exterior, that is, if any considerable amount is effused, but it does occasionally happen; such cases are known as "*totally concealed accidental hæmorrhage*" (Fig. 55).

It is most important, however, to recognise that whether blood escape externally or not, every case of accidental hæmorrhage is *partially concealed, i.e.*, the patient is actually losing more blood than flows from the vagina.

The more the bleeding is concealed, the graver the case:

1. Because the accumulation in the uterus tends to still further separate the placenta.

2. Because the acute stretching of the uterus causes great pain and shock; and

3. Because the diagnosis is less easy.

In all severe cases of accidental hæmorrhage the death of the child *in utero* is almost certain.

SYMPTOMS.

It is to the loss of blood and to its accumulation in the uterus that the characteristic symptoms are due.

Three classes of case may be recognised:

1. Slight cases.

2. Fulminant cases.
3. Recurrent cases.

Slight Cases.—Where the area of placental separation is small and the bleeding slight, the only symptom complained of may be pain, with or without accompanying vaginal loss. The onset of the pain is sudden and it may be associated with tenderness limited to a certain area of the uterus. Where no external bleeding occurs, the diagnosis may only be made by the finding of an old retro-placental clot at the time of labour.

These slighter cases often subside spontaneously, the pregnancy going on to term; but in others the attacks recur, and premature labour comes on sooner or later.

Fulminant Cases.—In a fulminant case, the onset is sudden with severe pain. The patient in an hour or two presents all the signs of hæmorrhage; the skin is white and cold, the superficial veins are invisible, the pulse is small and quick, the radial artery is impalpable as a cord, and no blush can be squeezed into the finger tips. In addition, there is a marked anxiety, distress, dyspnœa, and restlessness. The vaginal loss may be slight or absent altogether, but it is usually fairly free, though not in proportion to the severity of the symptoms.

Severe pain is complained of in the abdomen, especially in the "concealed" type of case, and the uterine wall is tense and tender, and the parts of the fœtus cannot be defined. Except in those cases in which the hæmorrhage begins in the first stage of labour, the cervix will be found closed and the lower pole of the fœtus can be palpated with the usual ease through the vaginal vault. The outlook in these fulminant cases is very bad. Many end fatally in spite of treatment. In others, the bleeding is checked either by nature or art, and labour coming on, the patient is delivered of a dead child.

Post-partum hæmorrhage may ensue, but it is not so common as is usually taught. When it does occur, it is an event of the greatest gravity, and even without it, many of the patients succumb to shock soon after delivery.

Recurrent Cases.—In these, the hæmorrhage recurs at intervals, each attack being associated with severe uterine pain and faintness. External loss is usually present, but some of the blood remains pent up in the uterus. The symptoms may extend over several days, during which the uterus progressively becomes larger and tenser from the accumulation of blood in its interior. Finally, the condition of the patient may become as that already described when dealing with the fulminant type of case.

DIAGNOSIS.

A correct diagnosis is of the utmost importance. When the external bleeding is profuse, attention is forcibly directed to the uterus; but when it is slight or absent altogether, the symptoms may be attributed to some intra-peritoneal catastrophe.

The diagnosis will depend upon whether the external bleeding is severe, whether it is slight, or whether it is absent altogether.

External Bleeding Severe.—Considering first those cases in which external bleeding constitutes a prominent sign, the diagnosis will rest between accidental hæmorrhage and that due to placenta prævia.

If the cervix is sufficiently dilated to admit the finger, as it is in nearly all cases of hæmorrhage due to placenta prævia, a certain diagnosis is possible, for if the hæmorrhage is "unavoidable" some portion of the placenta will be felt, except in those very rare cases where the lower edge of the placenta only slightly abuts on the upper limit of the lower uterine segment.

When the cervix will not admit the finger, the diagnosis is presumptive; but even then it can nearly always be correctly made if the practitioner remembers:

1. That the bleeding in placenta prævia in nearly every case comes on without any apparent cause.
2. That in placenta prævia there are no abdominal symptoms or signs comparable with those of accidental hæmorrhage.
3. That in placenta prævia the child is situated abnormally high.
4. That malpresentations are much commoner with placenta prævia.
5. That in placenta prævia there is a striking absence of the sensation of the hard lower pole of the fœtus in the lower uterine segment.
6. That the bleeding typical of placenta prævia comes on as a rule after the thirty-fourth week.

It must not of course be forgotten that at times accidental hæmorrhage ensues without any apparent cause, that it may be associated with a malpresentation of the child, especially if there is some contraction of the pelvis in addition, and that with such a contracted pelvis or with a transverse presentation, the lower pole of the fœtus may not be palpable on vaginal examination. All these facts, however, in connection with accidental hæmorrhage are unusual, whilst with unavoidable hæmorrhage they are the rule.

If after a consideration of these points, the obstetrician is still in doubt, and the case is sufficiently serious to demand interference, the cervix should be dilated under an anæsthetic and the condition determined. The cervix dilates very easily in cases of ante-partum

hæmorrhage, and as a rule the finger will suffice, mechanical dilators for this purpose being unnecessary.

External Bleeding Slight.—Where the external bleeding is only slight, one has to consider two classes of case :

(*a*) Where there is no internal bleeding worth considering.

In these cases abdominal pain is absent, and therefore they simulate placenta prævia more clearly than those of the preceding group. Nevertheless, on vaginal examination the lower pole of the fœtus can be distinctly felt through the vaginal vault.

(*b*) Where the internal bleeding is the most important factor. These cases of chiefly concealed accidental hæmorrhage are particularly dangerous, because the practitioner is apt to pay too much attention to the external loss and too little attention to the general condition of the patient.

The diagnosis of this class of case is the same as that of the next group.

External Bleeding Absent.—If the external bleeding is absent altogether the diagnosis is more difficult, for even when the classical signs of concealed accidental hæmorrhage are present, there is a tendency to doubt the occurrence of that that is invisible.

A pregnant woman is liable to the same disasters of the abdominal viscera as one not pregnant, and it is from these catastrophes, besides certain others peculiar to the pregnant state, that concealed or chiefly concealed accidental hæmorrhage has to be diagnosed.

These emergencies may be divided into cases presenting symptoms of shock and those presenting symptoms of hæmorrhage.

The distinction between the symptoms and signs of shock and those of internal hæmorrhage is of such importance, not only in this connection, but in other obstetric conditions that it is best to contrast them in the following tables :

Shock.	Hæmorrhage.
Face may be blanched.	Face and lips are markedly blanched.
Skin is cold and damp.	Skin is cold and damp.
Pulse feeble, fast, or slow, but the cord of the radial artery can be felt.	Pulse feeble, nearly always fast, and the cord of the radial artery cannot be felt.
A blush can be squeezed into the finger tips.	A blush cannot be squeezed into the finger tips.
The superficial veins are full of blood, especially noted when the veins are exposed for infusion.	The superficial veins are collapsed.

Shock.	Hæmorrhage.
Patient is quiet lying on her back.	Patient is very restless and distressed.
Respirations are quick and shallow.	Respirations are laboured, deep, and gasping.
Temperature may be subnormal.	Temperature commonly subnormal.
Faintness not commonly complained of.	Faintness complained of in all cases, and often a feeling of sinking through the bed.
Brandy enemata improve shock.	Brandy enemata increase hæmorrhage.

Simulating Conditions presenting Symptoms of Shock.—In these are included fulminant appendicitis, perforation of a gastric or duodenal ulcer, certain acute forms of intestinal obstruction, rupture of a solitary ovarian abscess, torsion of a myoma or ovarian cyst, and other rarer conditions.

All the conditions included in this group are associated with more or less profound shock.

Simulating Conditions presenting Symptoms of Hæmorrhage.—In this we place rupture of an abdominal aneurism, spontaneous rupture of the uterus, intra-peritoneal hæmorrhage from a myoma, rupture of the sac of an extra-uterine gestation advanced to the later months or thrombosis of the mesenteric vessels.

The conditions included in this group all present the symptoms of internal hæmorrhage, and for this reason simulate concealed accidental hæmorrhage more closely than those of the first group.

The conditions in both groups resemble accidental hæmorrhage, in the fact that a pregnant woman previously well is suddenly seized with a severe abdominal pain and profound constitutional disturbance.

In distinguishing accidental hæmorrhage from the members of either of the two groups, the main point is that in the former the signs centre in the tense tender uterus, and that elsewhere in the abdomen nothing is to be discovered.

The symptoms peculiar to each will be found described under their individual headings, and should be compared with those of concealed accidental hæmorrhage. All of them are very rare. If an accurate diagnosis from them is impossible, the safest course in such a dilemma would be to open the abdomen and investigate the condition.

TREATMENT.

Symptoms Slight.

Where the symptoms are but slight and the hæmorrhage inconsiderable, active treatment is not required. The patient should be sent to bed, put on a non-stimulating diet, and kept absolutely quiet by admonition and the use of sedative drugs. Of these the most useful are bromide of potassium, chloral hydrate, and opium in combination: Potass. Bromid., gr. xx; Chloral Hydrat., gr. xx; Tr. Opii, m. xx; Aqua, ad ʒj. Statim.

Instead, $\frac{1}{6}$ or $\frac{1}{4}$ grain of morphia may be injected subcutaneously.

The patient should not be allowed to get out of bed for a week after all symptoms have ceased. Slight cases so treated usually do well, the labour continuing to term. On the other hand, the hæmorrhage may recur in more serious amount in spite of every care, whilst in others, premature labour comes on a few days after the initial attack, but without a recurrence of the bleeding.

External Hæmorrhage Severe.

Where Labour has not begun.—The best course to adopt in these cases is to plug the vagina. This treatment, for a long time under a ban, was revived some years ago by the Dublin school of obstetricians, and their arguments in its favour have been generally accepted. Though on first consideration the logic of plugging the vagina to arrest bleeding that is going on some distance above it may not appear obvious, yet its efficacy in cases with free external hæmorrhage is proven.

It probably acts by powerfully stimulating the uterus to contraction, whereby not only is the bleeding arrested at its source, but labour, a most desired consummation, is brought on within a few hours.

To be efficacious, vaginal plugging must be carried out very thoroughly, and it is essential that the bladder be first emptied. The patient should be placed in the lithotomy position in a good light, and a large speculum of the "duck-bill" type having been inserted, the vagina is mopped clear of blood and clots. The plugging is then proceeded with. The best material to use is wool, fashioned into tampons by rolling up a piece about the size of a double walnut, and tying round it a piece of silk thread or common string, the ends being left long for subsequent withdrawal.

It is, of course, desirable that the tampons should be sterilised, and if there be sufficient time, this should be done by steaming or boiling. On urgent occasions, however, this may be impossible,

and they should then be immersed for some minutes in a 1 in 1,000 solution of biniodide of mercury.

In either case, all superfluous moisture must be squeezed out of them before they are inserted. Entirely dry tampons should not be used, for they shrink when soaked with blood, and thus the plugging soon becomes loose.

If wool is not available, gauze or strips of linen may be employed

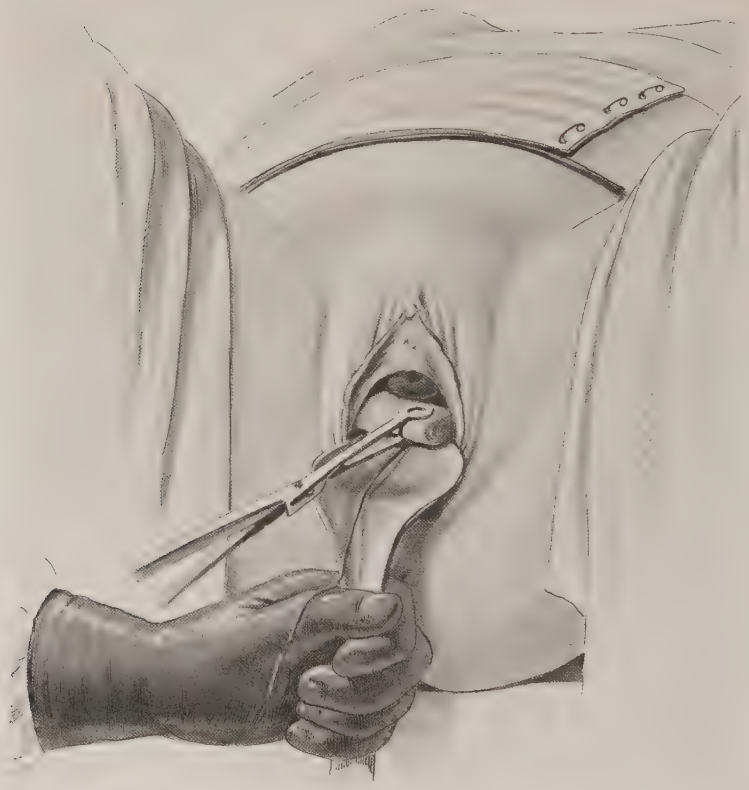


Fig. 56.—Accidental Hæmorrhage. Inserting the Plug.

instead, but both are less efficacious. Gauze in particular has the drawback of shrinking as it becomes soaked.

The tampons should be first inserted into the vaginal vault around the cervix, and then packed in until the vagina is entirely full and the lower plugs protude through the orifice (Fig. 56). A large mass of wool tightly rolled and wrung out of the biniodide solution is then applied in a long axis of the vulva so as to press

upon the protruding plugs. This is held in place by a bandage passing between the thighs, and fastened in front and behind to an abdominal binder, applied very tightly. The bandage must be pulled as taut as possible so as to exercise the maximum pressure (Fig. 57). The bladder must be emptied beforehand.

The membranes should not be ruptured beforehand, for, in the absence of uterine contractions, this proceeding facilitates the flow

FIG. 57.—Accidental Hæmorrhage. Application of the T Bandage.

of blood from the uterine sinuses. In most cases where vaginal plugging has been employed, labour pains come on within twelve hours.

The plugs should not be left *in situ* for more than twenty-four hours; at the end of this period they must be removed and the vagina douched. There need be no fear that their removal will be immediately followed by renewed bleeding.

If labour has not come on, the patient must be kept strictly at

rest for at least a week, and all movements or mental excitement capable of starting the hæmorrhage afresh must be interdicted.

Repetition of the plugging unless the bleeding recurs is to be deprecated, nor are we in favour of deliberately inducing labour by the introduction of tents or bougies as a prophylactic against a return of the symptoms.

Where Labour has begun.—As already stated, the majority of accidental hæmorrhages take place before labour has begun.

Where, however, it occurs in the course of labour the treatment depends upon the advancement of that process. The treatment will, therefore, be discussed under the following headings:

Cases where the os will not admit the finger.

Cases where the os will admit two fingers.

Cases where the os is already half dilated.

Cases in which full or nearly full dilatation of the os has been reached by the time the practitioner arrives.

The Os will not admit the Finger.—It will be best to treat the case like one in which labour has not begun, and to plug the vagina. Rupturing the membranes at this stage is not advisable; it delays the labour, and renders any subsequent attempt at rapid delivery more difficult and dangerous.

The Os will admit two Fingers.—The methods available are de Ribes' bag, plugging the vagina, and internal podalic version. With an os of this size both bipolar version and the introduction of a de Ribes' bag are feasible. The obstetrician therefore becomes empowered to promote its further dilatation independently of the bag of membranes. Under these circumstances the membranes can be ruptured with advantage, in order that the uterus may retract on to the solid body of the fœtus and compress the site of placental separation, and a de Ribes' bag should be inserted. The effect of the bag is to produce a characteristic tonicity of the uterus, very desirable in these circumstances. When the bag is expelled any malposition can be at once corrected.

If the practitioner has not got a bag, there is the alternative of bipolar version. By this means also the uterus can be made to retract on to the solid body of the fœtus, which is an advantage. If the child is presenting by the shoulder, face or brow, the version will remedy the malposition. If version stops the bleeding, the case should be left to nature. If it does not, delivery must be assisted by traction on the foot. Version as early as this in labour leads almost surely to the death of the child; but in the absence of a bag, the treatment is good.

If the bag is the method selected, the further treatment on

its expulsion depends upon whether the hæmorrhage recurs or not.

If the hæmorrhage recurs, and the head is engaged and the cervix is sufficiently dilated or dilatable, the forceps should be applied; otherwise internal version should be performed and the child extracted.

If the hæmorrhage ceases, and the presentation is favourable, leave the case to nature to complete, unless the patient's condition demands interference.

The Os is half dilated.—If by the time the practitioner reaches the case the os is half dilated, the membranes should be ruptured; this will often be sufficient to stop the bleeding. If the bleeding does not stop, an anæsthetic should be given, and if the head is presenting favourably and the cervix is easily dilatable, the child should be delivered with forceps.

If, on the other hand, the head is not lying favourably, or the shoulder or some other malpresentation is discovered, internal version should be performed and a leg brought down.

If the breech is presenting, a leg should be brought down, and if the bleeding is checked and the patient's condition does not further deteriorate, the case may now be left to nature to complete. In the reverse of these conditions, delivery must be hastened by traction on the foot. Forceps delivery, if possible, gives the child a better chance than extraction by the breech; but it is to be remembered that the chance of the child surviving is very small in any case.

The Os is fully dilated.—Cases in which separation of the placenta takes place in the second stage are rare. The fact that the bleeding shows externally points to the presenting part not entirely filling the pelvis. The practitioner must therefore carefully examine for some contraction of the inlet or malpresentation of the head. *It is just in these cases that the possibility of bleeding being due to spontaneous rupture of the uterus obtains.* If the bleeding becomes serious in amount and the presenting part does not advance, an anæsthetic should be given and the condition of the uterus investigated. If no rupture can be found, the hæmorrhage must be due to partial separation of the placenta. The treatment will vary according to the condition of affairs. If the head is lying favourably and has engaged, forceps should be applied. If it has not engaged, either on account of malpresentation or disparity between the head and pelvis, internal version should be carried out, provided it can be done safely. Finally, if the patient's condition is urgent, the head should be perforated forthwith and the child extracted.

Cases of Completely or Chiefly Concealed Hæmorrhage.

Completely or chiefly concealed hæmorrhage practically never occurs if the uterus is active, the contractions preventing blood being retained in the uterus. The condition argues a degree of atonicity of the uterine wall. The problem of how best to treat these cases is beset with difficulties.

Plugging the Vagina.—The *rationale* of the vaginal plug in accidental hæmorrhage is that it stimulates contraction of the uterine muscle. In cases of concealed hæmorrhage, however, the uterus is so inert that it is doubtful if plugging can have any effect in this direction.

It is, however, a method easy to apply, and has this great advantage, that it avoids rapid emptying of the uterus, a proceeding which always impresses severe shock on these patients.

We think there can be no doubt that in some of these cases the bleeding has stopped by the time the practitioner comes on the scene, and that in such plugging the vagina has the great advantage of compelling him to pursue a course of masterly inactivity.

If the patient succeeds in tiding through the acutest period of the anæmia, the presence of the plug will accelerate the reappearance of uterine tonicity, and eventually bring about labour.

Cæsarean Section.—To empty the uterus is obviously the most direct way to control the bleeding, but the obstetrician is faced with this difficulty that, in patients already *in extremis*, rapid evacuation is followed by a high degree of shock, which in itself may bring about a fatal result.

Simultaneously therefore with the performance of the operation, intra-venous saline infusion should be carried out, whilst shock is to be combated by the intra-muscular injection of pituitary extract.

The uterus having been emptied, the removal of the organ is usually advisable because in the majority of cases the uterine wall is found to be diffusely infiltrated with blood, indicating a profoundly degenerate condition of the musculature.

In some cases free blood is found in the peritoneal cavity as well, and in a case recorded by Shannon multiple superficial ruptures of the uterine wall were present.

Forced Delivery.—If the necessary appliances and assistance requisite for Cæsarean section are not obtainable, an alternative method of treatment would be to empty the uterus by "forced delivery." The methods of "forced delivery" are discussed elsewhere. In cases of concealed accidental hæmorrhage, its performance is not difficult, (1) because the pregnancy is rarely at term,

and (2) because the collapsed state of the patient renders dilatation of the cervix easy.

Manual dilatation should be employed, and the hand being forced into the uterus, a leg should be seized and brought down. By traction on it, the half breech is pulled through the cervix, and the case is then managed like any other artificial breech delivery.

The method has the advantage of being able to be performed single-handed, but in certainty of controlling post-partum hæmorrhage it is inferior to Cæsarean section, whilst the shock is as great and the cervix may be badly lacerated.

CONCLUSIONS.

With regard to those cases in which the patient is already *in extremis* by the time the practitioner arrives on the scene, we are of opinion that the best course is to let the uterus alone.

In such patients, there can be no doubt that rapid evacuation of the uterus superimposes a shock that may markedly accelerate the fatal result, inevitable though it may be under any circumstances. The greatest judgment, therefore, is required in deciding on the course to pursue; for while, on the one hand, non-interference may involve the stigma of death undelivered, or an overlooked spontaneous rupture of the uterine wall, rapid emptying of the uterus may be followed almost immediately by death from shock.

There can be no doubt that in certain of these desperate cases the bleeding has spontaneously ceased by the time the practitioner arrives, and that the best chance will be given the patient by not interfering with the uterus further than by plugging the vagina and proceeding to restore her general condition by saline venous infusion, the injection of pituitary extract, and strychnine, and the administration of brandy either by the mouth or per rectum.

If she reacts to these measures and continues to improve, the subsequent course would be to await the onset of natural labour.

If, on the other hand, concealed hæmorrhage can be diagnosed before the patient is *in extremis*, we are of opinion that Cæsarean section offers the patient the best chance of success.

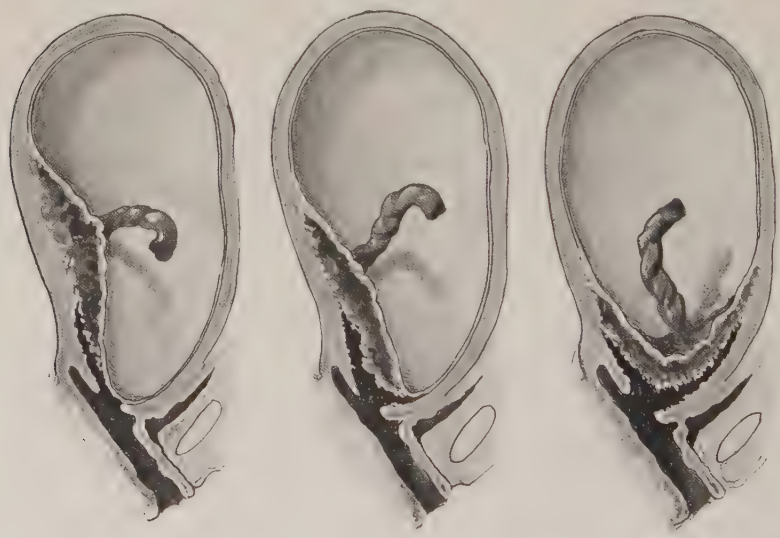
UNAVOIDABLE HÆMORRHAGE (PLACENTA PRÆVIA).

Unavoidable hæmorrhage is defined as hæmorrhage after the child is viable, due to the separation or partial separation of a placenta which is situated upon the lower uterine segment (placenta prævia).

CAUSE.

The cause of placenta prævia is not definitely known. It is much commoner in women who have previously borne children than in those pregnant for the first time. The attachment of the placenta to the lower uterine segment necessitates its separation in part before the child can pass through the cervix. Such separation may begin before labour or be coincident with it.

In regard to the first event, the detachment is due to the progressive expansion of the lower uterine segment which takes place during the last two months of pregnancy, and as the placenta is inelastic a "slip" occurs between it and the uterine wall. The



FIGS. 58, 59, 60.—Placenta Prævia. Varieties of Insertion: 1. Marginal; 2. Partial; 3. Complete.

detachment thus produced is apt to be small in amount at first, but to recur with each succeeding "slip," so that the amount of separated placenta gradually increases. Each detachment is marked by hæmorrhage more or less free, according to the extent of separation.

Separation occurring during labour is produced in the same way but more acutely, with the result that the amount of blood lost is, as a rule, much greater.

Placenta prævia is usually divided into three degrees, complete, marginal and partial, according to the relation of its attachment to the external os.

In *marginal* attachment the membranes overlie the cervical canal, out the placental edge can be felt immediately to one side of it (Fig. 58).

In *partial* attachment, a flap of separated placenta overlies the canal, the membranes being detected immediately to one side of it. It is obvious that this degree is purely arbitrary, since, before dilatation of the os, there are only two varieties, central and marginal (Fig. 59).

In *complete* attachment the placenta overlies the cervical canal, and it is impossible to reach the membranes without separating some portion of it (Fig. 60).

For practical purposes, however, they are useful, for in the degree to which the placenta occupies the lower uterine segment depends the period of onset and the extent of its necessary separation, while the relative difficulty of the case largely hinges on the ease or not with which the membranes can be reached.

EFFECTS.

It may also be accepted that the lower down the placenta is situated, the more likely is bleeding to come on before labour is due.

Pregnancy, therefore, tends to be prematurely brought to a close with placenta prævia, and particularly so when the attachment is central, because any degree of preparturitional separation induces uterine contractions.

In labour, uterine inertia is likely to occur from loss of blood, the absence of the normal dilator of the cervix, and in some cases a degree of rigidity of the tissues of the latter.

Abnormal presentations are more common, because the head is not properly engaged in the pelvis at the onset of labour.

Finally, post-partum hæmorrhage may result from the uterine inertia, from the fact that the placenta is already partially separated, and from lacerations of the cervix due to operative delivery.

Sepsis in all its varieties is more liable from the diminished resistance due to bleeding, the means adopted and necessary for delivery, and from the low situation of the placental site.

SYMPTOMS.

The symptom of placenta prævia is hæmorrhage. In this regard the cases may be divided into four groups :

1. Those in which small recurrent hæmorrhages occur before labour, but labour itself is not accompanied with excessive bleeding. In these the separation of the placenta over the lower

segment is effected beforehand by a series of small slips, so that by the time labour begins no further separation is necessary.

2. Those in which a sudden severe hæmorrhage occurs before labour has begun or is due.

3. Those cases in which, after several small hæmorrhages beforehand, labour begins with excessive bleeding.

4. Those in which the bleeding is coincident with the onset of labour.

SIGNS.

In most cases the practitioner is able to make an immediate diagnosis by passing his finger through the cervix, and it follows, therefore, that the condition, as a rule, is recognised without difficulty.

In those instances, however, where bleeding demanding attention comes on before the cervical canal is sufficiently dilated to admit the finger, it is necessary to distinguish it from *revealed accidental hæmorrhage*.

DIAGNOSIS.

Abdominal examination in a case of placenta prævia discloses that the fœtus is lying abnormally high. In many cases the head is not engaged or a definite malpresentation may be made out, and with a vertex presentation auscultation will discover the maximum intensity of the fœtal heart sounds at the level of the umbilicus. The uterus itself appears normal. From the vagina an abnormal absence of the presenting part is felt, and the lower segment of the uterus feels soft and thick.

In accidental hæmorrhage, the signs are solely abdominal, with great pain in and tenderness of the uterus, whilst nothing abnormal can be detected by vaginal examination, see p. 246.

If, on such considerations, the diagnosis is still in doubt, the finger should be introduced through the cervix under an anæsthetic.

PROGNOSIS.

Placenta prævia is a very serious condition, though not as grave as the more severe degrees of accidental separation. The fatal result is, of course, chiefly due to the loss of blood; but in some cases it is partly caused by the added shock of rapid delivery, and to sepsis following delivery. The individual risk depends upon the degree of the abnormality, the time at which the case comes

under treatment, and the skill and judgment with which the latter is carried out.

The average fœtal mortality is from 50 to 60 per cent.

TREATMENT.

From the point of treatment, the cases may be divided into two groups:

Those in which labour has not commenced, and

Those in which labour has already started.

Cases where the Bleeding begins before Labour.

Small recurrent losses in the last month or two of pregnancy are extremely suggestive of placenta prævia, but may be due to accidental separation of a normally situated placenta. A single profuse loss, though it may be due to placenta prævia, is more suggestive of accidental hæmorrhage.

The first difficulty in both these varieties of case is the diagnosis. This subject has been already discussed, see p. 248. Cases of slight bleeding, where a certain diagnosis cannot be made without passing the finger through the undilated cervix, may be treated expectantly by absolute rest and sedatives as described when dealing with slight accidental hæmorrhage, see p. 251.

The indication for such sedative treatment is, however, principally in the interests of the child. If, therefore, there is a strong presumption of placenta prævia, and as the fœtal mortality at term in these cases is so high, it is certainly not worth while to add further risk to the mother by subjecting her to the danger of a serious recurrent hæmorrhage, unless she can be placed under constant supervision and adequately treated at any time should necessity arise. It must be remembered that, as a rule, the earlier the bleeding comes on before term, the more serious is the case, though, as has been stated, some of these patients pass through labour without undue hæmorrhage, because the necessary separation of the placenta has been effected gradually beforehand.

If sedative treatment is being tried, and the hæmorrhage recurs more severely and labour has not yet started, and also in those instances where a single profuse hæmorrhage before labour first suggests the condition, active measures are indicated.

At the outset the diagnosis must be made absolute by passing a finger through the cervix. As this should be done under an anæsthetic, with the needful appliances at hand either to introduce a de Ribes' bag or to perform Cæsarean section, as the case may seem to demand, it may very well happen that it may be

desirable to temporarily check the bleeding pending the necessary preparations for radical interference.

For this end, vaginal plugging in the manner already described on p. 251 will be found very serviceable, for though as a routine

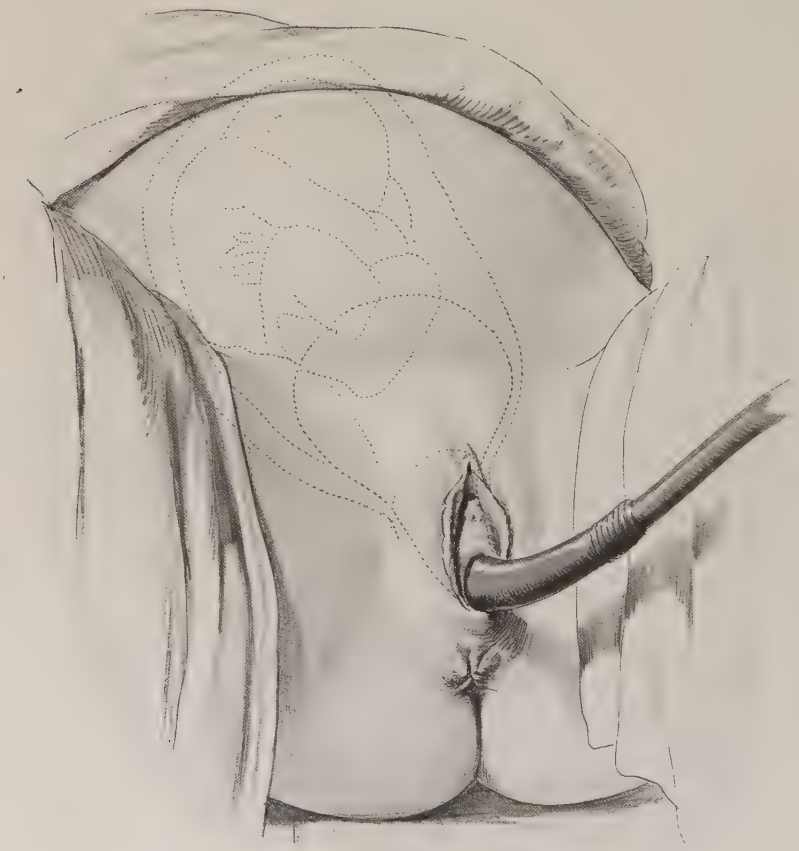


Fig. 61.—Placenta Prævia. De Ribes' Bag *in situ*.

method of treatment it is not to be advised, as a temporary expedient it answers well.

For the examination under the anæsthetic, the patient should be placed in the lithotomy position, and the vagina having been well douched, the gloved finger should be passed through the os and the condition explored. Placenta prævia having been discovered, the treatment will depend on its degree.

Partial or Marginal Attachment.—These varieties can be treated

by the introduction of de Ribes' bag or the performance of bipolar version.

Introduction of de Ribes' Bag.—Whenever the membranes can be reached in the proximity of the os, the introduction of de Ribes' bag is the best treatment (Fig. 61). The os can as a rule be dilated with the gloved fingers to a sufficient size for this under an anæsthetic, but if necessary Hegar's dilators must be used.

The method of introducing a bag is fully described on p. 724. The introduction of a bag nearly always controls the bleeding, and acts as a powerful stimulant to the uterus to contract. The membranes should be ruptured as the bag is passed in. Passing the bag without first rupturing the membranes may result in a further and at times serious separation of the placenta. The small amount of liquor amnii that does escape will favour contraction of the uterus, and sufficient will be retained to perform internal version, which can be accomplished if necessary when the bag is expelled.

If the bleeding continues in spite of the bag, traction should be made on it by attaching to it a cord with a 2-lb. weight which hangs from the end of the bed. Under ordinary circumstances, a bag is spontaneously expelled in from four to eight hours, and if traction has been made on it, in a much shorter time.

When the bag comes out, the case should be left to nature, unless the presentation is such that further interference is indicated on that account, or unless the bleeding recurs.

In the latter case the treatment will depend upon whether the uterus is contracting properly or not.

Uterine Contraction Good.—If the vertex is presenting, deliver with forceps, dilating the cervix further with the hand if necessary.

If the breech is presenting, pull down a leg and deliver by traction. In all other presentations perform internal podalic version and deliver.

Uterine Contraction Bad.—Perform podalic version, bringing a leg into the vagina. If, after this has been done, no further bleeding occurs, the labour should be left to nature to complete until the umbilicus is born, when prompt measures must be taken to secure rapid delivery of the head, supposing that the umbilical cord is still beating.

If, in spite of the version, the patient continues to lose blood, traction must be made on the foot, the half breech pulled through the cervix, and the child delivered forthwith.

Bipolar Version.—If the practitioner does not possess a bag, an alternative treatment in the class of case under discussion would be

to force two fingers through the os, perform bipolar version, rupture the membranes, and bring down a leg (Fig. 62). This proceeding is not so good as the use of the bag, because labour pains are less rapidly induced; and if the bleeding continues in spite of the version, traction on the foot becomes necessary (Fig. 63). This means a much more rapid emptying of the uterus than if a bag was first employed, and rapid delivery, especially in the absence of

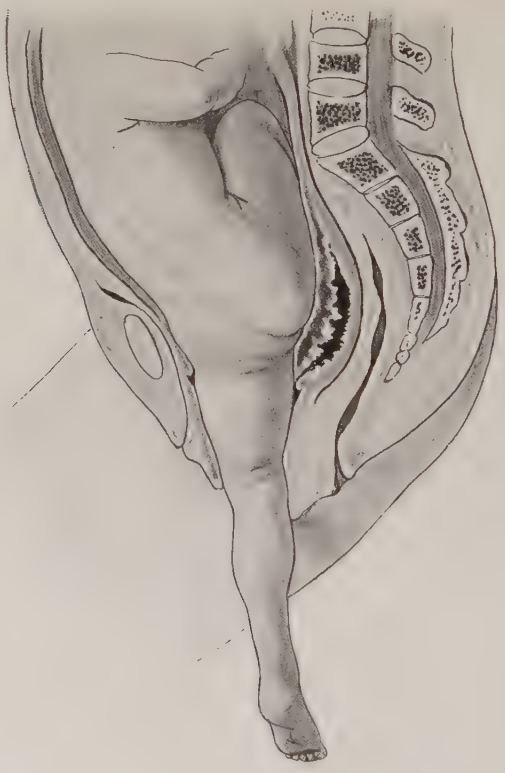


Fig. 62.—Placenta Prævia. Half breech acting as Plug.

labour pains and with a patient much collapsed, is undesirable in cases of hæmorrhage, see p. 257.

The fœtal mortality when the bag is used is lower than obtains in bipolar version.

Treatment of the Placenta.—The delivery of the child may or may not be followed by post-partum hæmorrhage. In view of its likelihood, every preparation should have been made to cope with it, see p. 274. If no undue bleeding is taking place, the delivery of the placenta may be managed on the usual lines; but if the reverse,

it should be immediately expressed or manually removed, and the means of treating post-partum hæmorrhage described on p. 275 applied.

Complete Attachment.—When the placenta is found to cover the os, the treatment will depend entirely upon how much of the

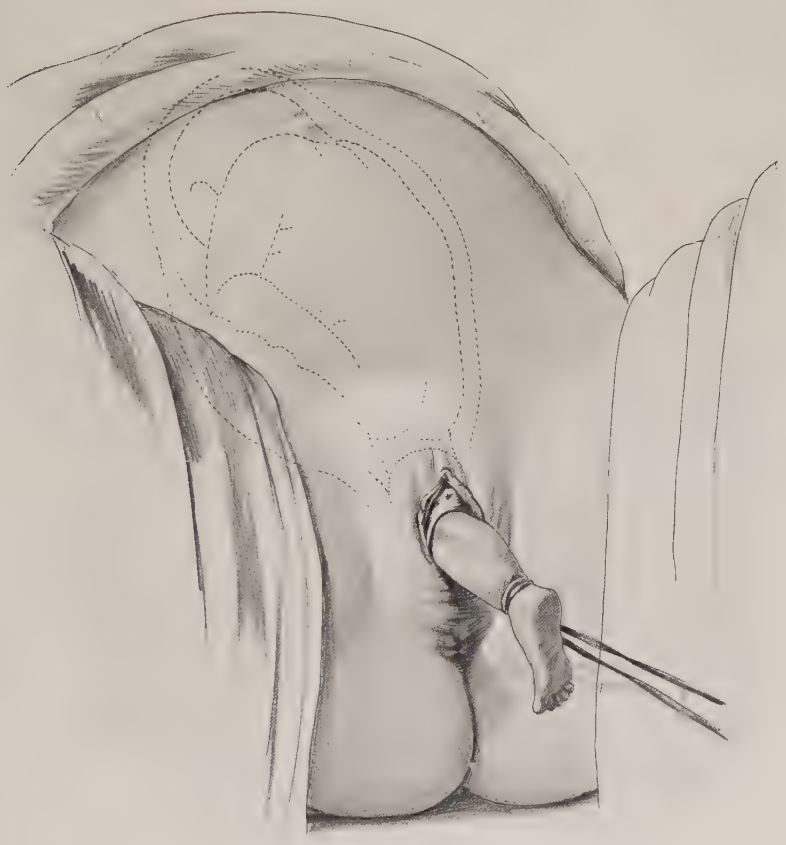


Fig. 63.—Placenta Prævia. Traction on the half breech.

lower uterine segment round the os the placenta is attached to. We may roughly divide the cases into two groups. One group contains those in which the membranes cannot be reached with the finger, although the fingers can be inserted through the os. This condition is very rare, and also particularly dangerous, because so much of the placenta will have to be separated before the birth of the child can take place.

The other group, which is the commonest, comprises those cases in which the membranes can be reached by the fingers.

Cases in which the Membranes can be reached.—These cases should be treated in a way similar to that described for partial and marginal cases, only before the bag is inserted or bipolar version is performed, the placenta will have to be separated somewhat from the lower uterine segment till the bag of membranes is reached. The edge of the placenta can then be pulled on one side and the bag inserted, or the leg brought down as the case may be.

As a matter of experience, most cases of complete placenta prævia are easily and successfully treated by this method, as the os is only overlapped to a minor degree.

Cases in which the Membranes cannot be reached.—These cases are so rare that it is difficult to form any definite opinion as to which is the best treatment. The safest treatment for the generality of practitioners to follow, unable as many of them are to obtain efficient assistance, and with patients situated in unsuitable surroundings, is to plug the vagina until the os will admit two fingers, and then to bore a hole through the placenta and insert a de Ribes' bag or bring down a leg. If difficulty is found in boring through the placenta with the finger, a pair of pressure forceps may be used. They are desperate cases, anyhow.

Of late years the question of Cæsarean section has been discussed in connection with these cases of complete placenta prævia and has been carried out successfully.

We have no doubt that there are certain of them in which Cæsarean section should always be performed, as, for instance:

1. Cases in which there is such an amount of pelvic obstruction that this will tend to a prolonged and difficult labour.

2. Cases in which the cervix is very rigid and cannot be dilated under an anæsthetic.

3. In primigravidæ where, from the size of the passages, it would appear that labour must be prolonged.

4. In cases of placenta prævia complicated by eclampsia.

The cases enumerated under these four headings will, of course, form the minority. For the remainder we think Cæsarean section to be the best treatment under certain specified conditions, which are as follows:

(*a*) The operation must be performed by one conversant with abdominal surgery.

(*b*) The surroundings must be such that the chance of infection is reduced to a minimum.

(*c*) Efficient help must be obtainable. To perform Cæsarean

section by the light of one candle and with the assistance of a nurse, who has to divide her attention between anæsthetising the patient and assisting the operator, is no doubt a *tour de force*, but if persisted in as a routine would lead to poor results.

(*d*) The case must be a clean one, that is to say, there must have been no previous attempts to deliver the child or any evidence of infection.

(*e*) The patient must not be *in extremis*.

Cæsarean section would necessarily mean a greater percentage of live children, but it is the mother with whom we are most concerned.

The mortality of Cæsarean section in properly selected cases is lower than that of placenta prævia, and probably much lower than the worst varieties of the latter. Whether Cæsarean section for complete placenta prævia as a routine would lower the mortality remains to be seen. Sufficient cases have not been reported. It is, however, on the assumption and firm conviction that Cæsarean section under the conditions specified would lower this mortality that we strongly advise the operation.

In such cases, therefore, the bleeding provoked by the examination should be temporarily controlled by vaginal plugging and preparations made for the major operation. It is otherwise, however, if the hæmorrhage has been severe, for where a patient is greatly exsanguinated the added shock of an abdominal operation and rapid delivery may kill her outright. In such cases, therefore, it is better to temporarily check the hæmorrhage by tightly plugging the vagina, and to proceed with saline infusion and restoratives until such time as she may be considered fit to undergo the operation.

Cases of profound hæmorrhage from separation of a placenta prævia before labour has started are very rare fortunately, and when occurring are probably due to "accidental" and not "unavoidable" detachment.

It follows, therefore, that most instances of central attachment discovered before the onset of labour are suitable for Cæsarean section.

The details of this operation will be found fully set forth on p. 662. It might be thought that there would be some danger of post-partum hæmorrhage from inefficient retraction of the abnormally situated placental site in these cases, but recorded examples do not appear to support this.

In such an event, hysterectomy should be promptly performed.

Cases in which the Hæmorrhage is Synchronous with Labour.

From the point of treatment these may be divided into :

Cases where the os will admit only one finger.

Cases where the os will admit two fingers.

Cases where the os is already half dilated, and

Cases in which full or nearly full dilatation of the os has been reached by the time the practitioner arrives.

The Os will admit one Finger.—Partial or Marginal Attachment.—The case can be treated with de Ribes' bag, or bipolar version.

The bag is the best method of treatment, but it will first be necessary to dilate the cervix to " two-finger " size before it can be introduced. This is generally easily affected under an anæsthetic by the unaided fingers, because the bulk of these patients are multiparæ, in whom the parts are soft and dilatable. The first finger having been passed through the os, the second finger is gradually forced up by its side. Where exceptional rigidity of the tissues exists, dilators may be used, but they are very rarely required. Two-finger dilatation having been attained, the bag should be introduced in the manner described on p. 724. During the dilatation and introduction, free bleeding may occur, but it should cease immediately the bag is distended. If so, no further action should be taken, but the natural expulsion of the bag should be awaited.

If, however, the bleeding continues or recurs later, traction should be made on the bag by a 2-lb. weight.

When the bag is expelled, the course to be pursued depends upon whether the hæmorrhage recurs or not.

Hæmorrhage recurs.—If the vertex is presenting and the cervix is sufficiently dilated, forceps should be applied and the child delivered.

If the head is presenting and the cervix is not sufficiently dilated for forceps or easily dilatable, internal podalic version is the best treatment.

If the breech or other abnormal presentation is present, a leg should be brought down into the vagina, or internal podalic version performed, as the case may be.

The half breech having been brought down, the expulsion of the child should be left to the natural forces unless bleeding is still going on, when it must be hastened by traction on the foot.

It is most important to remember that in all these cases artificial and rapid delivery is to be avoided, if possible, because of the shock that follows rapid evacuation of the uterus.

Hæmorrhage ceases.—If no further bleeding follows the expulsion of the bag with a normal pelvis and the vertex is presenting, the second stage should be allowed to proceed naturally. If, on the other hand, the presentation is unfavourable or the pelvis contracted, internal version should be performed.

If the practitioner does not possess a bag, cases of this class can be treated by bipolar version after the cervix has been dilated with the fingers. The details of this treatment are more fully described in the next section.

Complete Placenta Prævia.—Where a central placenta prævia coexists with a cervix only capable of admitting a single finger, the question of treatment becomes more difficult. We are of opinion that delivery by Cæsarean section holds out the best chance for such a case. Temporarily the vagina should be tightly plugged, see p. 251, until the necessary appliances and assistance are at hand. It is to be remembered that if the patient's condition is already desperate from loss of blood, the sudden delivery will impose additional shock.

In such cases, therefore, saline venous infusion, carried out if possible during the operation, is desirable. As a rule, however, such severe bleeding does not occur so early in the labour.

Supposing the circumstances forbid Cæsarean section, such a case may be alternately treated after the cervix has been dilated with the fingers by means of de Ribes' bag or bipolar version. Of the two the bag is the best. It should be thrust through the placenta and distended as quickly as possible, for the bleeding is sure to be free.

It will probably be necessary to make traction on the bag to entirely arrest the hæmorrhage. Directly the bag is expelled, internal version should be performed and a leg brought down. If the bleeding is stopped, the delivery should then be left to nature, but if it has not, the leg must be pulled on and the child delivered artificially. If, because he has no bag, the practitioner has to resort to bipolar version, this should be done by forcing two fingers through the placenta. The half breech is then brought down into the cervix, and any further bleeding is controlled by traction on the foot.

Os will admit two Fingers.—Partial or Marginal Placenta.—Where the cervix will admit two fingers by the time the practitioner arrives, the indications for the use of the bag are stronger, for in this case no preliminary cervical dilatation is required. In the absence of a bag, bipolar version is the proper treatment.

Complete Placenta Prævia.—Where the placenta is complete, the

indication for Cæsarean section is less strong than under the circumstances discussed in the last section, because (1) the labour being more advanced, a larger quantity of blood has probably been lost and the patient's condition is more likely to be such that rapid delivery is to be avoided if possible, (2) because the child is more likely to be dead or dying, and (3) because the introduction of a bag is easier and quicker than in the preceding case and more likely to be followed by a good result.

In deciding the course to pursue, the circumstances must be taken into account. With a patient in good condition and all appliances at hand, as obtains, say, in a lying-in hospital, the abdominal operation would be the best; but in the reverse, the introduction of a bag is to be recommended.

Os half dilated.—When the os is half dilated, the treatment will depend somewhat on the state of the child.

If the Child is alive and vigorous.—Under these circumstances, if the cervix is easily dilatable, the child should be delivered with forceps, since the chance of obtaining a living child by these means is greater than by version.

Child dead or dying.—In this case the child has not to be considered, and the best treatment will be internal podalic version.

Os fully dilated.—Where by the time the practitioner has arrived the os is practically fully dilated, the membranes should be ruptured at once, if rupture has not already occurred. The subsequent treatment will depend upon whether the hæmorrhage ceases or not.

Hæmorrhage ceases.—The case may be left to nature if the vertex is presenting.

If the breech is presenting, a leg should be pulled down. If other abnormal presentations are present, internal podalic version should be performed.

If the pelvis is contracted and the presenting part is above the brim, then internal version or craniotomy should be performed.

Hæmorrhage does not cease.—With a vertex presentation in a normal pelvis, the forceps should be applied and the head pulled through.

In all other presentations a leg should be brought down and the placenta compressed by the half breech.

CHAPTER XVIII.

Hæmorrhage (*continued*).

POST-PARTUM HÆMORRHAGE.

There are two varieties of post-partum hæmorrhage: *primary* where the bleeding comes on directly or almost directly after the birth of the child; and *secondary*, when it occurs between the time the attendant left the patient after the birth of the child and the end of the puerperium, and in either case the blood flows from the placental site or from some laceration of the genital canal.

HÆMORRHAGE FROM THE PLACENTAL SITE.

CAUSES.

Excessive hæmorrhage from the placental site is immediately due to failure of retraction of the uterine muscle fibres.

This failure is due to two factors:

1. A lack of muscular tone, and
2. The uterus not being empty.

Of these two the first is the most important, for, given a vigorous uterine wall, it is possible for a considerable mass of placenta membrane or blood clot to be retained in the uterus without producing excessive hæmorrhage.

On the other hand, a degree of retractile force sufficient to prevent hæmorrhage, providing the uterus is empty, may be insufficient if this condition does not obtain.

It is extremely rare for the uterine wall to be so completely atonic as to have entirely lost all power of retraction, and in most cases of post-partum hæmorrhage the two causes mentioned are in operation together.

A fibroid tumour may rarely prevent the uterine wall retracting. More commonly blood clot, pieces of membrane, pieces of placenta or placenta succenturiata are the exciting causes.

Severe ante-partum hæmorrhage is one of the most serious, if not the most serious, cause of post-partum hæmorrhage due to uterine atony, inasmuch as the patient may have already lost so much blood that a few ounces more, quite insufficient to affect a patient who has not had any previous bleeding, will at once prove fatal.

Over-distension of the uterus from twins or hydramnios certainly predisposes to post-partum inertia, as it does to ante-partum.

Several cases of post-partum hæmorrhage have been reported in women who have had ventrofixation performed.

Bad management of the first stages of labour must be accounted as a predisposing cause, because failure to recognise some complication likely to cause inertia or ante-partum hæmorrhage, or the inefficient treatment of these conditions may lead later on to post-partum bleeding.

During the second stage of labour, if the uterus is allowed to become exhausted or the child is delivered in the absence of pains, serious hæmorrhage may result.

In the third stage of labour, failure to hold the uterus properly or premature expression of the placenta are causes of excessive bleeding. Again, trying to separate the placenta or to express it in the interval of a pain or in the wrong direction may lead to inversion of the uterus, one of the most dangerous forms of post-partum hæmorrhage. Serious bleeding has also followed some sudden disturbance of the nervous system, such as fright or grief.

Mechanism of the Hæmorrhage.—The hæmorrhage initiates as a comparatively slow leakage from the placental site; clots then form within the cavity, and by their presence diminish a retractile force, already deficient. The uterine wall thus further relaxed allows an increased flow of blood, which in its turn increases the distension of the uterus, further relaxes the musculature, and accelerates the hæmorrhage. Thus a vicious circle is set up, until with the uterus greatly distended and the uterine wall entirely relaxed, the blood is pouring into the cavity. Up to this point the amount of blood escaping externally may have been quite moderate; but pressure now being made on the uterus either by the hand of the attendant or by a forced expiratory effort on the part of the patient, a great quantity of blood is expelled with a gush into the bed. Although, of course, the blood accumulated in the uterus is already lost to the patient, its sudden expulsion in this manner produces an additional and instant fall of blood pressure which may be immediately fatal.

The degree to which the hæmorrhage is at first concealed varies in different cases. It is most in those cases in which the loss of muscular tone is the principal factor. In one exceptional case of which we have experience, a patient bled to death into the uterus *without a drop of blood escaping externally*. The substance of these remarks may be expressed in the following aphorisms, both extremely important from the point of treatment:

No bleeding uterus is ever empty.

Every case of post-partum hæmorrhage from the placental site is at first more or less "concealed."

SECONDARY HÆMORRHAGE.

Hæmorrhage from the uterus occurring some hours or days after the labour is either due to retained placenta, delayed involution of the uterus, backward misplacement of that organ, or extrusion of a myoma.

DIAGNOSIS.

It is only in the very rare cases of concealed or almost concealed hæmorrhage that any difficulty could arise in recognising the fact that bleeding is going on. In such the uterus may be so distended and soft as to be with difficulty detected through the abdominal wall, especially if sought for below the umbilicus.

In these circumstances palpation should be commenced in the upper abdomen, and the hand descend from there until the fundus is felt. Where the slightest suspicion exists that the patient is bleeding concealedly into her uterus, the cavity should immediately be explored by the hand.

The distinction between bleeding from the placental site and that from lacerations of the genital canal is usually easy, because in the former the uterus is always abnormally large and soft, whereas in the latter it is usually well retracted. In hæmorrhage from the placental site the blood comes away in a gush as the uterus is compressed, whilst in lacerations of the cervix, vagina or vulva, the loss is a steady trickle uninfluenced by handling the uterus. Hæmorrhage due to laceration of the genital tract comes on at once after the birth of the child, and, as a rule, the blood is of brighter colour.

In rupture of the uterus, however, profuse external hæmorrhage is unusual, and thus far concealed bleeding from the placental site is mimicked. But examination per abdomen shows that the uterus is not unduly large and soft, in spite of the fact that the external loss is disproportionate to the severe symptoms. In all cases of doubt, careful examination of the vulva, perineum and vaginal walls should first be made, and in the absence of a bleeding laceration the cervix should be inspected.

Inversion of the uterus is recognised as a lump seen or felt in the vagina or coming through the vulva, and on abdominal examination the uterus is missing from its normal situation. The shock is marked. For further details see pp. 182 and 190.

Where the diagnosis is in doubt, and as a first measure if the

bleeding or constitutional signs are alarming, the hand should be introduced into the uterus to exclude laceration of its wall or bleeding from the placental site, see also p. 440.

TREATMENT.

Prophylactic.

Severe hæmorrhage from the placental site is a preventable disaster in most cases if proper precautions are taken during pregnancy and labour. We will now point out what precautions are necessary.

During Pregnancy.—Any debilitating diseases discovered during pregnancy should be treated, since the uterine muscle will suffer with the other muscles in the body, and its retracting power may be thereby impaired. In some women the blood has undoubtedly insufficient clotting properties, and if from the history of post-partum hæmorrhage at previous labours any patient appears to be thus afflicted, a course of chloride or lactate of calcium, 10 gr. three times daily for the last month of pregnancy, is indicated. We have known this drug apparently successful in this way.

During Labour.—Conservation of the Strength of the Uterus. To allow the uterus to wear itself out during the second stage of labour is to directly court post-partum hæmorrhage. So soon, therefore, as it becomes evident that the natural powers are insufficient, artificial assistance should be supplied. The importance of this is insisted on in the chapter dealing with sluggishness and exhaustion of the uterus, p. 288.

Where the pains have been weak from the beginning of labour, special care should be taken that the uterus shall not be unduly tasked during the second stage.

On the other hand, where exhaustion is already complete or even considerable, extraction of the child is a blunder of the first magnitude, for, under such circumstances, the separation of the placenta is bound to be followed by a profuse hæmorrhage.

Such a degree of exhaustion will, however, never occur if the uterine contractions be assisted directly it becomes apparent that they are unequal to their task.

Previous Preparation of the Appliances needed to Check the Hæmorrhage.—It should be a routine in every case of labour for the practitioner to lay out and have ready the appliances he may require in the event of post-partum hæmorrhage. The hypodermic syringe, filled with 20 min. of ergotin, should be laid on a table within convenient reach. Phials of pituitary extract and strychnine should be placed ready. The intra-uterine douche nozzle, previously boiled,

should be attached to the tubes of the douche apparatus, which the nurse should have already tested to ensure its proper working, and she should also have prepared the douche solution at a heat only requiring the addition of a little boiling water to bring it to 120° F.

The neglect of these simple precautions will, in the event of hæmorrhage, be productive of much waste of time, confusion, and imperfect treatment.

Manual Control of the Uterus.—After the child is delivered, the uterus should be manually controlled until the third stage has terminated, and it is evident that the uterus is well and permanently retracted.

In the absence of hæmorrhage and before the placenta has separated, the uterus should be held tightly, as shown in Fig. 64, and occasionally kneaded if it shows signs of relaxation.

After the expulsion or expression of the placenta, the uterus must still be grasped in the manner shown in Fig. 64. Enclosed in the grip of the hand, it is impossible for any great degree of distension of the uterine cavity to occur, and hence the most formidable factor of grave hæmorrhage is abrogated.

Firm retraction is to be maintained by vigorously kneading the organ when it shows signs of relaxing.

The Routine Use of Ergotin.—We are in favour of the routine use of ergotin by hypodermic injection. This drug, as a prophylactic against hæmorrhage, is admirable, though as a treatment for it, it is feeble and merely an adjunct to more efficient measures.

It should not be administered, as a rule, until the expression of the placenta or its manual removal is in immediate anticipation, when it should be given just before the necessary manipulations. It is especially indicated where, for any reason, such as previous inertia in the second stage, post-partum hæmorrhage is apprehended.

If labour is progressing normally and there is a history of post-partum hæmorrhage at the previous labour, ergot may be given just as the head is being "crowned."

Curative.

The measures taken to arrest post-partum hæmorrhage must be prompt and vigorous, and the same routine should be followed in all cases, whether they be slight or severe. This is particularly important in view of the fact that in many of these cases the amount of blood escaping externally does not nearly represent the total quantity flowing from the placental sinuses.

The practitioner who treats every slight case of abnormal bleeding

in the third stage as though it were severe will rarely see a bad case of post-partum hæmorrhage.

The steps to be taken may be conveniently grouped in order as follows:

Grasping the Uterus.—If the uterus is not already under the

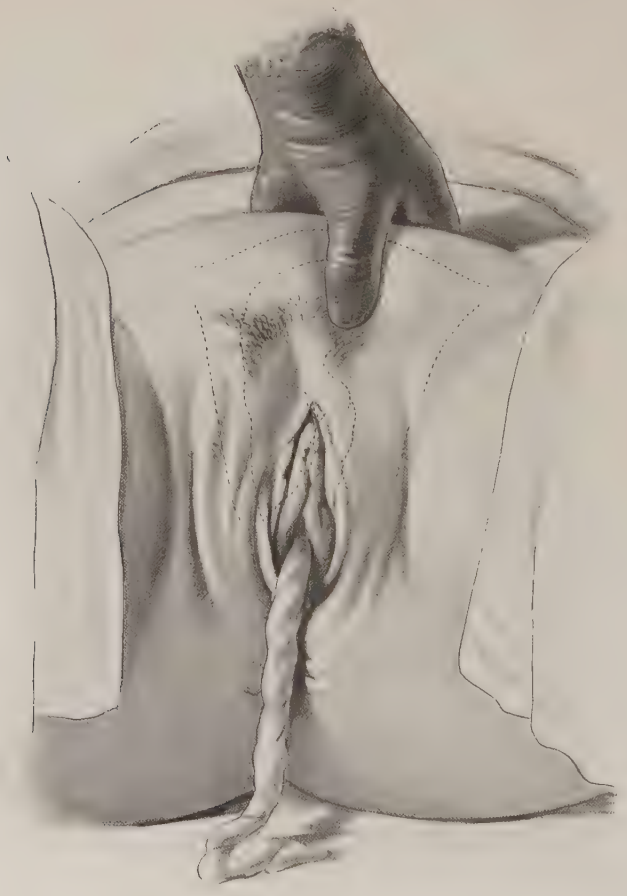


FIG. 64.—Post-partum Hæmorrhage. Grasping the Uterus.

control of the hand, it must be immediately grasped in the manner shown in Fig. 64. If it is soft and indistinct, the search for it should be began well above the umbilicus, for in such circumstances it is certain to be much enlarged. When found, the uterus should be compressed and forcibly anteflexed, so as to render its control more easy.

Manual Evacuation.—With the left hand still grasping the uterus, the right hand should then be introduced into its cavity, and the contents (placenta, blood clot, or membranes, as the case may be) immediately evacuated (Fig. 65).

The importance of manual evacuation in all cases, whether the placenta be delivered or not, cannot be insisted on too strongly.

FIG. 65.—Post-partum Hæmorrhage. Emptying the Uterus.

If the uterus is not empty a much greater degree of retraction is required to close the placental sinuses. Moreover, a uterus full of blood clot cannot be strongly grasped with the hand on the abdomen because it is too large, and for the same reason bimanual compression is inefficacious. Further, an intra-uterine douche does

not produce its proper effect, for the fluid runs out through a channel in the clot and the heat fails to reach the uterine wall at all, whilst in many cases the flow through the tube is obstructed.

Finally, the omission to explore the uterus may result in a

FIG. 66.—Post-partum Hæmorrhage. The Hot Intra-uterine Douche.

succenturiate placenta or a rupture of the uterine wall remaining undetected.

The Hot Intra-uterine Douche.—The cavity being evacuated, a hot intra-uterine douche should immediately be administered at a temperature of 120° F. (Fig. 66). It is better to use an antiseptic

solution, such as 1 in 4,000 mercuric biniodide or lysol, 1 drachm to one quart, but for purposes of hæmostasis hot water alone is equally efficient. Not less than one quart should be used. Whilst the douche is running the uterus should be gently kneaded.

Ergotin.—While the douche is being given, ergotin (20 min.) should

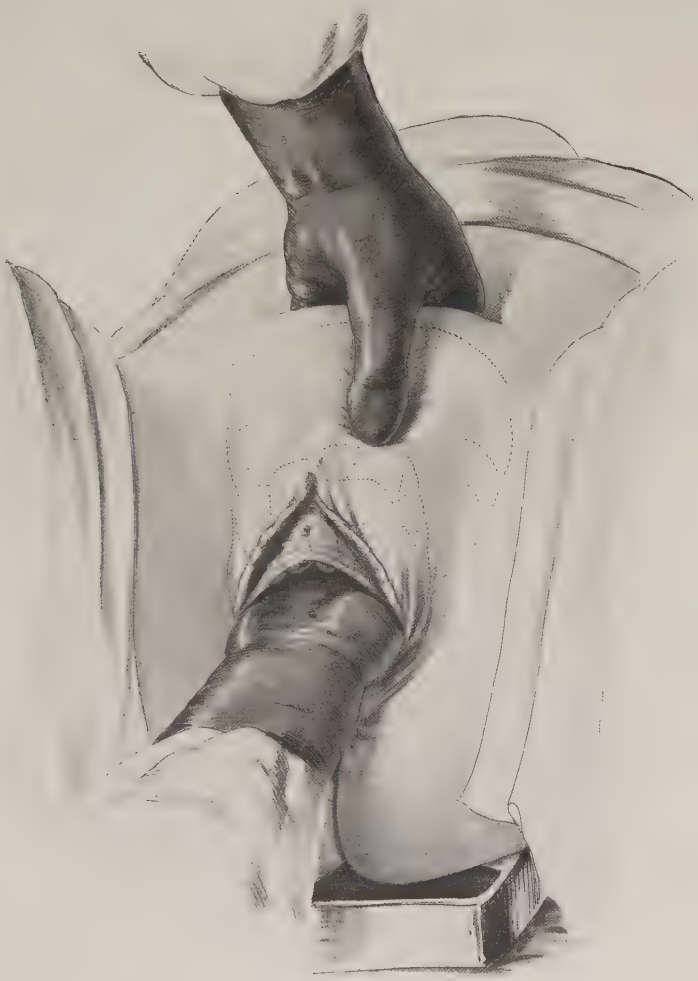


Fig. 67.—Post-partum Hæmorrhage. Bimanual Compression.

be injected with the left hand. At least five minutes elapses before it produces its effect. It should be injected deeply into the muscles of the buttock or thigh. Pituitary extract in our opinion is not as efficient.

The douche given, the uterus should be well kneaded, the external

genitals swabbed up, and the vaginal outlet inspected to see if any further bleeding is going on. If the proceedings already described have been adequately performed, the necessity for any further measures will be very rare, the hæmorrhage almost invariably being stopped thereby. In such exceptional cases, bimanual compression should be applied.

Bimanual Compression.—The right hand being passed into the

Fig. 68.—Post-partum Hæmorrhage. Plugging the Uterus.

vagina, it is closed, and the fist placed in the anterior vaginal fornix, whilst the left hand anteflexes the uterus against it (Fig. 67). For bimanual compression to be successful it is absolutely necessary that the uterus should first be emptied. It is impossible to efficiently command an organ still containing the placenta or distended with blood clot. The bleeding having been controlled, the compression must be maintained until the ergotin previously administered takes effect.

Other Measures that have been Suggested.—Besides the methods just described, other means of arresting post-partum hæmorrhage have been recommended, but none of them, in our opinion, deserve more than brief mention.

Compression of the abdominal aorta is not a proceeding to be commended except where the routine methods already described have been tried and failed: first, because it is impossible to do it where the uterus is much relaxed and distended; and secondly, because it has no action in promoting efficient uterine retraction, which alone is able to permanently arrest the bleeding from the placental site.

The application of styptics to the wall of the uterine cavity is not only inadequate at the time, but predisposes to septic infection later.

Packing the uterus with gauze has more to commend it, but such an extreme measure must very rarely be required (Fig. 68). To efficiently fill the cavity a very large amount of material would be needed, whilst the introduction is not easy unassisted. Where the measures previously recommended have been properly carried out, such a last resort will hardly ever be necessary.

If the bleeding is due to inversion of the uterus, the case should be treated as described on p. 183.

TREATMENT OF SECONDARY HÆMORRHAGE.

Bleeding coming on hours or days after labour should be treated by exploration of the uterus under an anæsthetic as described on p. 229.

RECUPERATIVE TREATMENT AFTER HÆMORRHAGE.

The hæmorrhage having been controlled, the practitioner must remember that the further treatment is almost in its way as important as arrest of the bleeding.

After a severe hæmorrhage the patient incurs immediate risk of syncope from loss of blood, weakness of the cardiac muscle, and anæmia of the cardiac centres. This risk must be minimised as far as possible by rest, posture, stimulation, and saline infusion.

Rest.—The patient must be kept *absolutely* at rest. She must not be allowed even to move her arms to feed herself, lest the additional strain on the heart caused by the use of these muscles prove too much for it.

There is a further necessity for rest. The clots of anæmic blood are not firm, and therefore those that are formed in the sinuses are apt to become detached if the vascular tension is raised by moving or excitement. Fatal embolism may thus be caused.

Posture.—It is a good plan to raise the foot of the bed about 12 in. In the absence of any more suitable object, such as a box, stool, or blocks of wood, this can be done with books. It will allow more blood to circulate round the vital centres, and therefore lessen the risk of syncope.

Stimulation.—Hypodermic injections of strychnine to combat heart failure and of pituitary extract to raise the blood pressure are very suitable methods of stimulation, and in the absence of these brandy, by the mouth or hypodermically, may be given.

Saline Infusion.—The administration of normal salt solution is the best method of treating the collapse and serious after-effects of bleeding. If the patient's condition is not very bad, rectal injections of the saline may be sufficient, say 6 to 8 oz. at a time, or if it is given slowly and with a long tube passed 18 in. or so into the colon, one pint or more may be given. In serious cases, however, the best and proper method is intravenous injection. An alternative but not such a good method is subcutaneous infusion. If this is used the practitioner must remember to regulate the flow so that not more than 1 oz. is infused in three to five minutes. A quicker rate than this causes such pain by distension that the patient is likely to object. Frequent drinks of water should be given by the mouth in addition.

Convalescence.

A patient who has had a severe hæmorrhage will want very careful watching. She will certainly have to keep to her bed longer than the usual ten days.

She must be given a nourishing diet, and a little alcohol, especially the red wines, may be of assistance. The resulting anæmia should be treated with iron and arsenic.

PROGNOSIS.

As already mentioned, a patient after post-partum hæmorrhage runs the risk of syncope and pulmonary embolism. Likewise she is more liable to sepsis, puerperal insanity, and subinvolution. A special watch must be kept for the swollen leg, due to thrombosis of the femoral vein, which is predisposed to by the anæmia. A few cases never recover from the anæmia, which passes into the pernicious variety.

HÆMORRHAGE FROM LACERATIONS.

CAUSES.

To give rise to severe post-partum hæmorrhage the laceration must be rather deep, the usual tears of the cervix and vulval

outlet found in most primigravidæ causing no bleeding worth speaking about.

Serious lacerations causing post-partum hæmorrhage are due most often to delivery by forceps through an undilated cervix, rapid extraction of the after-coming head, and manual dilatation of the cervix.

Bad lacerations of the vagina and vulva may cause serious bleeding, especially the latter, if the injury is in the region of the clitoris.

The external rupture of a varicose vein will also cause serious hæmorrhage.

DIAGNOSIS.

The distinction of hæmorrhage due to lacerations of the canal from that due to deficient retraction of the placental site has been already dealt with, see p. 273. Where with a firmly retracted uterus a steady trickle of blood is occurring, of a bright colour and uninfluenced by compression of the uterus, bleeding from some laceration may be assumed.

The site of the bleeding, which may be a laceration of the vulva, of the vagina or of the cervix, may be identified on inspection, the cervix being drawn down to the vulva with a ring forceps if necessary; but in all cases of doubt the uterine cavity should be explored.

TREATMENT.

Prophylactic. The subject of lacerations of the genital canal during labour is dealt with in Chapter XXIV., and those sections should be studied in this connection.

Curative.—Hæmorrhage occurring from a ruptured uterus will require the treatment described on p. 441.

Where the bleeding is due to laceration of the cervix a vaginal douche at a temperature of 120° F. will often check it. If it does not, the cervix and the vagina beneath it should be plugged with sterile gauze, or the rent should be deliberately sutured up. There can be no doubt that the suture of such lacerations is the proper procedure, but its performance requires assistance, which is often not obtainable under the circumstances of an average labour.

The patient, being anæsthetised, should be placed in the lithotomy position and a broad posterior vaginal retractor inserted. The vagina should then be thoroughly douched out and the cervix pulled down with a pair of ring forceps until the laceration is exposed throughout its whole extent. It should then be sutured, preferably with a continuous stitch begun at the top end of the laceration. Strong catgut is the suture material most commonly used. If silk

is used, interrupted sutures are preferable, as they come away easier afterwards.

Lacerations of the vagina, perineum, and vulva should be treated as described on pp. 450, 461, and 470.

Very persistent bleeding may take place from a torn artery at the bottom of a small, deep split of the vulva, hidden, perhaps, by the fold of the labia. A mattress suture passed under it closes the wound and arrests the bleeding at the same time.

A careful search for such a laceration should be made in cases of persistent bleeding without obvious cause.

RUPTURE OF A VAGINAL OR VULVAL VEIN IN LABOUR.

CAUSE.

During the stress of the second stage, a vaginal or vulval vein may rupture. The vein may also be ruptured during forceps delivery.

SYMPTOMS.

The patient complains of a severe pain in the neighbourhood of the lesion, and of the symptoms of hæmorrhage according to the amount of blood lost.

The occurrence may be noticed before or after delivery, usually the latter, the hæmorrhage being kept in check by the pressure of the head. In the most marked example of this complication we have met with, the swelling appeared during the second stage of labour.

SIGNS.

As a rule the rupture is subcutaneous, and leads to the formation of a tender œdematous swelling of gradually darkening colour to one or other side of the vaginal entrance. Occasionally, especially when a varicose vulval vein gives way, the rent may involve the skin, with free external hæmorrhage. The fact that the swelling is due to an effusion of blood under the skin may at first be overlooked, because the characteristic dark colour does not appear immediately. There is, however, nothing else that can produce so large a tumour in so short a time.

RESULT.

The swelling may be so large before delivery that the birth of the child is hindered. The hæmorrhage has caused death. If the swelling appears after labour, it tends to occlude the vagina, and

may prevent the proper outflow of the lochia. Where the effusion is not large, resorption of the blood clot usually occurs after some days. Where the tumour is of considerable size, the stretched mucous membrane covering it on its vaginal aspect will probably slough. This event is preceded by further swelling of an œdematous nature, owing to inflammatory reaction provoked by the presence of the clot and by much constitutional disturbance. Pus may form, and the abscess, destroying the perineum, may rupture into the rectum ; much deformity of the parts may be the ultimate result.

TREATMENT.

Immediate delivery is desirable to relieve the pressure in the veins below the presenting part. If the bleeding comes from an external rupture of a vulval vein, firm pressure or the application of a mattress ligature will stop it.

Directly the child is delivered, the congested condition of the veins is relieved, and as a rule the bleeding spontaneously ceases.

Cold compresses should be applied at first to prevent further bleeding and allay inflammatory reaction. If the tension becomes very great and there is much pain, the swelling should be incised, as much of the clot as possible turned out, and warm antiseptic fomentations applied every three hours.

In the event of suppuration occurring, the abscess should be opened out and the cavity irrigated twice a day with hydrogen peroxide, 10 volumes, and lightly packed with iodoform gauze.

INTRA-ABDOMINAL HÆMORRHAGE.

Intra-peritoneal.

CAUSE.

Rupture of the gravid uterus during labour is discussed on p. 432.

Extra-uterine gestation, the most common cause of abdominal hæmorrhage in a pregnant woman, will be found treated of in Chapter XXVIII.

As a result of violence, the liver, spleen, stomach, intestine, or even the uterus may be ruptured during pregnancy.

Spontaneous rupture of the uterus during pregnancy has most often been recorded in connection with the scar of a previous Cæsarean section. Very rarely degeneration of the uterine wall appears to have been the cause. Vesicular mole occasionally perforates into the peritoneal cavity.

In women of childbearing age an abdominal aneurysm is a pathological curiosity. It is a remarkable fact that aneurysm of

the splenic artery has been recorded several times in connection with pregnancy.

It has happened that omentum adherent to the uterus has become suddenly torn off by trauma or uterine contraction and caused intra-peritoneal bleeding.

In the same manner the sudden separation of an adherent uterus may give rise to bleeding. This accident has most often been recorded in association with myomata. Spontaneous rupture of varices in the broad ligament may occur, especially in connection with torsion of the uterus.

Torsion of the pregnant uterus most often occurs when the organ is myomatous. The patient complains of intense pain, and of the symptoms of hæmorrhage and shock. The uterus is very tender, tense, and swollen owing to the congestion caused by the venous stasis, and there is profound shock. Finally, some of the turgid veins give way, producing acute intra-peritoneal hæmorrhage. More or less loss per vaginam is also present.

Torsion of an ovarian or fibroid tumour may also give rise to intra-peritoneal bleeding, see Chapter XIV.

DIAGNOSIS.

Whichever the source of the bleeding, the standard signs of intra-peritoneal hæmorrhage are present: rapid small pulse, pallor and subnormal temperature, acute abdominal pain, rigidity of the abdominal wall, and gaseous distension of the intestines.

In traumatic cases the diagnosis is usually evident. Spontaneous bleeding in the later months simulates concealed hæmorrhage. The points of difference are considered on p. 249.

Various abdominal catastrophes not producing bleeding are also mimicked, such as a perforated gastric ulcer.

TREATMENT.

Acute abdominal symptoms occurring during pregnancy, labour or the puerperium and not definitely to be attributed to intra-uterine hæmorrhage, should be treated by immediate abdominal section. The source of the bleeding being found, appropriate measures to stop it must be taken.

In the case of torsion of the uterus, the removal of the organ by subtotal hysterectomy is indicated.

Extra-peritoneal.

Hæmorrhage into the pelvic cellular tissue is a much rarer event than hæmorrhage into the peritoneal cavity.

CAUSES.

Extra-uterine gestation is the only likely cause of intra-pelvic hæmatoma during pregnancy. For the symptoms and signs of this complication the reader is referred to Chapter XXVIII.

During labour, bleeding into the broad ligament may be due to extra-peritoneal rupture of the uterus. Exceptionally a vein in this situation may give way during delivery (especially if this be forcible) and occasion a hæmatoma.

TREATMENT.

Extra-peritoneal hæmorrhage from an ectopic gestation must be treated in the manner described on p. 564. The treatment of uterine rupture is discussed on p. 441. Small hæmatomata due to rupture of a broad ligament vein may be left to absorb.

CHAPTER XIX.

Labour Complicated by Anomalies of the Forces.

In all cases of delay in labour some abnormality of the uterine contractions is either present from the start or is developed later on.

There are three main varieties of abnormal uterine contractions:

1. Cases in which the uterus is sluggish.
2. Cases in which the uterus is exhausted.
3. Cases in which the uterus is hyperactive.

SLUGGISH UTERUS.

CAUSES.

Sluggishness of the uterus may be the result of many causes, of which the following are the principal:

Primary Weakness of the Musculature.—The vigour of the uterine muscle varies in different persons. It is greater in the young than in the relatively old. All conditions producing constitutional weakness similarly affect the uterine contractions. Thus labour is apt to be slow in persons the subject of chronic wasting diseases, or in a state of debility acutely acquired, such as follows profuse ante-partum hæmorrhage. The uterus of women who have borne many children is frequently degenerate and weak.

Over-distension and Misplacement.—Great distension of the uterus, such as that produced by excess of liquor amnii or twins, prevents efficient contraction; excessive anteversion the result of pendulous belly has the same effect.

Fixation of the Uterus.—A uterus tethered to the anterior abdominal wall as the result of an operation for ventrofixation frequently contracts weakly.

Tumours of or in the Vicinity of the Uterus.—Myomata, if of considerable size and embedded in the uterine wall, interfere with its contraction.

Tumours lying in the vicinity of the organ also prevent its proper contraction, probably by the displacement they occasion.

An over-full bladder is a potent cause of uterine sluggishness, and a full rectum has at times a similar effect.

Reflex Nervous Inhibition.—The manner in which fright or emotion inhibits the pains is well known. The most extreme examples of reflex inhibition are seen in young neurotic primigravidæ, in whom the pains of labour are so acutely felt that actual self-inhibition of the uterine contractions occurs. As a result, the full force of the contraction never expends itself, but instead the uterus is maintained in a state of irritable tonicity, superposed on which are frequent wavering spasmodic contractions which, possessing little force, give great pain.

It is a condition of inhibitory spasm analogous to the effect produced on the rectum by a painful fissure of the anus, and differs entirely from true sluggishness of the uterus, in which deficient contractions are the result of real weakness of the uterine wall. The result, however, is the same, namely, that labour is prolonged from the absence of sufficient power to expand the lower segment. The cervix and lower segment when examined are found in a state of unnatural rigidity, which does not relax with the contractions of the upper segment, or may even appear to be accentuated by them.

Early Rupture of the Membranes.—If the membranes rupture too early, the polarity of the uterus is interfered with, so that as the cervix is not stretched properly, the contractions of the body are inefficient.

Adhesion of the Membranes in the Neighbourhood of the Os.—This acts in a similar way to premature rupture: the membranes attached to the lower uterine segment do not separate as they should at the commencement of labour, and consequently do not project well into the os; thus the dilating wedge is for the time being lost.

Rigidity of the Cervix.—Rigidity of the cervix is often associated with reflex nervous inhibition.

RESULTS.

The delay in labour which a sluggish uterus causes varies in seriousness according to the circumstances under which it occurs.

First Stage of Labour.

Before Rupture of the Membranes.—Weak pains, so long as the membranes are unruptured, do no direct harm either to the mother or child.

An exception to this statement must be made in the case of the reflex inhibitory spasm that occurs in neurotic primigravidæ. In such the combined effects of emotional distress and constant pain on

a highly wrought mind produces after a time a condition of exhaustion both generally and locally. This, no doubt, has its beneficial aspect in allaying the hyper-irritability of the reflex nervous mechanism, and without doubt most of such cases, if entirely left to their own resources, would eventually deliver themselves.

On the other hand, the distress of the patient and the anxiety of her relatives is frequently such as to compel the practitioner to take measures for the relief of the condition.

After Rupture of the Membranes.—After rupture of the membranes, the delay in labour assumes a more serious aspect, especially if the rupture be premature and the cervix only partially dilated, for in such a case it is possible that artifice will be required to fully expand the os. An exception to this occurs with hydramnios, for here the reduction in size of the uterus will increase the strength of the pains.

Premature rupture of the membranes is especially unfortunate in over-sensitive primigravidæ suffering from reflex inhibitory spasm, because dilatation of the os has then to be completed by the presenting part, a proceeding much more painful than the normal mechanism.

Second Stage of Labour.

A sluggish uterus in the second stage of labour delays the birth of the child; but since the contractions are feeble, pressure effects either on the maternal soft parts or the child are not, as a rule, to be feared. The gravest aspect of sluggishness in this stage is the supervention of exhaustion of the uterus, the pains gradually lessening in power and frequency until they cease altogether. Extraction of the child after this event will certainly be followed by severe post-partum hæmorrhage, see p. 272.

Third Stage of Labour.

In the third stage of labour the sluggish uterus leads to delay in the birth of the placenta; but it is doubtful if it can *per se* be considered a cause of post-partum hæmorrhage, for probably, however marked the condition, the uterus has sufficient retractile power to close the placental sinuses.

The failure of such retraction is better considered as due to the supervention of exhaustion, more or less complete, at the end of a long labour, on a uterus primarily inert. As, however, there is no means of deciding whether the sluggish action of the uterus is complicated by exhaustion or not, the treatment of either condition in the third stage is the same.

DIAGNOSIS.

A sluggish uterus has to be distinguished from an exhausted uterus, but the subject is better discussed after the latter condition has been considered, see p. 295.

TREATMENT.

The First Stage.

In the first stage of labour, the treatment should be founded on the cause.

Drugs.—If the bowels have not been lately opened, a dose of castor oil is given with advantage, for all purgatives exercise a stimulating effect on the uterus. The use of drugs primarily directed to the uterus is more open to question. There are two at the service of the obstetrician, ergot and pituitary extract. It is often stated that ergot only stimulates retraction, not contraction of the uterine muscle. With this view we are not in agreement, believing that the two processes are intimately allied. The use of pituitary extract in obstetrics has only lately been advocated, chiefly for post-partum hæmorrhage. Experimentally it produces marked contractions of the uterus.

The drawback to the use of ergot or pituitary extract is the possibility of the presence of some abnormality in the labour, which later will necessitate operative interference. In such an event, a strongly contractile state of the uterus will embarrass the obstetrician and make the necessary operation much more difficult.

Moreover, deficient pains in the first stage due to pure lethargy of the uterine muscle is rarely a serious matter either for mother or child, and given that the labour is in other respects normal, full dilatation of the os will almost invariably be ultimately effected by nature unaided. Ergot or pituitary extract, therefore, should only be given in exceptional cases in a primigravida, and not in a multigravida until it is absolutely ascertained that the relations of the head and pelvis are normal and the cervix is sufficiently dilated to deliver the child within half an hour, for the drugs by causing a degree of tonic contraction of the uterus tend to asphyxiate the child.

The use of pituitary extract has been followed by certain disasters, namely, premature separation of the placenta and rupture of the uterus.

It is usually advised in uterine inertia to administer a sedative or hypnotic, in order that the patient's powers may be recuperated by sleep. If the woman be really tired out, the administration of an

hypnotic is justifiable; but otherwise in a case of pure uterine lethargy, it is illogical. Such treatment should not be adopted merely to allow of the practitioner getting his night's sleep.

It is otherwise, however, where inertia is the result of reflex inhibition. Here the failure of the uterus to contract efficiently is due to an excessive sensibility on the part of the patient, for which sedatives are directly indicated. The following combination of opium, chloral, and potassium bromide often gives respite from the acuteness of the pain, with the result that the contractions become stronger and more regular: Tr. Opii, m. xx; Chloral Hydrate, gr. xx; Potass. Bromide, gr. xx.; Aqua Chlorof., ad ʒj.

The administration of scopolamine and morphine is specially indicated in these cases of reflex nervous inhibition, see p. 579.

Another method of abolishing the excessive pain-reflex is light chloroform administration just up to the point of beginning anæsthesia. Its drawback is the undesirability of keeping a patient under the influence of chloroform for the long period required for completion of the first stage.

The administration of chloroform is also the best means of abolishing spasmodic contractions of the cervix, see p. 310.

Painting the cervix with cocain was advocated many years ago for abnormal cervical rigidity. This condition of the cervix is, as has been shown, always associated with reflex inhibitory inertia of the upper uterine segment. The treatment is therefore logical. That a certain degree of risk is connected with the application of considerable quantities of cocain in some persons is, however, undoubted, and we have ourselves never tried it, preferring the other measures previously described.

Rupturing the Membranes.—In the case of over-distension of the uterus by an excess of liquor amnii, the force of the contractions may be increased by prematurely rupturing the membranes. The greatest judgment is required in deciding when to do this. It should not as a rule be done until the os is at least two-thirds dilated.

Dilating the Cervix.—In many cases of reflex inhibitory spasm, premature rupture of the membranes has occurred. In others, the amount of liquor amnii may be scanty. Either state probably markedly accentuates the painfulness and difficulty with which the cervix is dilated. It is in such that the introduction of Champetier de Ribes' bag under anæsthesia will, by providing a fluid wedge, greatly increase the ease and rapidity of dilatation.

In the commoner type of sluggish uterus, provided that the condition is not due to over-distension, the introduction of a bag

acts also as a good stimulus to uterine contraction. For the method of introducing the bag see p. 724.

Additional Methods of Treatment. — The patient should be encouraged to walk about and to take a proper amount of food.

If the abdomen be pendulous, the contractions are promoted by a firm broad binder, applied so as to hold the uterus upright in the middle line.

A full bladder must, of course, be emptied, if necessary, by the catheter. If the action of the uterus is being interfered with by the presence of adhesions or tumours, the treatment proper to these conditions must be carried out.

The Second Stage.

In the second stage the treatment of a sluggish uterus is much simplified, and may be summed up in the words "artificial extraction."

The essence of the delay in the second stage is that the uterine pains for the time being are too weak to accomplish their task, and there is considerable risk that the uterus, worn out by futile contractions, may pass into a condition of exhaustion, with consequent post-partum hæmorrhage.

The practitioner should therefore resort to operative delivery so soon as it becomes apparent that the uterus is unequal to its task, for by so doing he conserves its strength in preparation for the third stage.

The rule that the forceps should be applied when the second stage has lasted over two hours in a primigravida, or over one hour in a multigravida, though purely an arbitrary one, is a good working maxim.

It is not, however, necessary in all cases to waste this length of time before deciding to interfere. The efficacy of the uterus is to be judged by the degree it drives the presenting part downwards with each contraction, and if the practitioner, having watched a certain number of pains, finds they have had no effect on the position of the head, he is quite justified in at once proceeding to give the necessary assistance.

It is, of course, most necessary that, before making a diagnosis of delay due to inertia, the possibility of obstruction due to malpresentation or any other cause should be absolutely excluded by a careful digital examination.

The Third Stage.

As has been pointed out, inertia of the uterus is often complicated in the third stage with more or less exhaustion of the uterus,

the primarily weak organ becoming worn out at the close of the labour.

A sluggish action of the uterus *per se* causes delay in the birth of the placenta, because the uterine retraction is too feeble to separate it, and the contraction not strong enough to expel it.

If separation, however, occurs, especially if partial, undue hæmorrhage may result, its amount and amenability to treatment depending upon the degree to which exhaustion complicates the condition.

Where, therefore, the uterine action has been sluggish through labour, the practitioner should anticipate the occurrence of post-partum hæmorrhage, and by correct treatment and previous arrangement of his resources be prepared to prevent or check it.

Drugs.—The administration of ergotin or pituitary extract is strongly indicated to supply the contractile and retractile force to the uterus which it is feared is lacking.

Management of the Uterus.—The uterine fundus should be controlled and gently massaged by the hand.

Expression of the Placenta.—In these cases, as long as no undue hæmorrhage is going on, the birth of the placenta should not be hurried, for delay gives the uterus time to recover itself after the fatigue of the second stage.

Preparation of Appliances.—The appliances requisite for the treatment of post-partum hæmorrhage as described on p. 274 should be at hand.

In the event, however, of partial placental separation being proclaimed by undue bleeding, the uterus must be immediately emptied in the manner described under post-partum hæmorrhage on p. 277, for in cases in which there is a reasonable probability of post-partum hæmorrhage occurring, it is better to be sure of preventing it by the complete exhibition of the means there described than to delay these measures until severe bleeding has already occurred.

UTERINE EXHAUSTION.

The term uterine exhaustion implies a condition of muscle fatigue occurring in the uterus.

CAUSES.

It is obvious that the more feeble the uterus is to start with, the sooner will fatigue supervene in the face of a task beyond its strength. Thus, in the greater proportion of cases, uterine exhaustion has supervened on a condition of primary weakness.

But just as the most powerful man set to some athletic feat beyond his strength would become exhausted in the attempt, so a

uterus primarily very vigorous may in the face of obstruction eventually become tired out.

SYMPTOMS AND SIGNS.

The characteristic feature of uterine exhaustion is a gradual diminution of the strength, and, after a time, the frequency of the uterine contractions.

Associated with this are the usual signs of muscle and nervous fatigue, an emotional state, a facies indicative of both, and a moderately raised pulse rate and temperature, the two last being probably due to absorption of metabolic muscle products. The uterus becomes more flabby and less excitable by stimulation, but it is neither painful nor tender.

The condition of the child depends upon the events that have preceded the onset of exhaustion. If the membranes are unruptured it is probably uninfluenced by the maternal state. If they have ruptured, but the exhausted state is secondary to a sluggish uterus, the presenting part will probably be found freely movable wherever it be lying, and the condition of the child will be good.

In the case, however, of a vigorous uterus exhausted by some obstruction, the life of the child will be sure to be in jeopardy, its pulse being slow and meconium escaping by the side of the head. In such a case, if the head has passed into the pelvis, it may remain firmly impacted there even after the pains have passed off. In such cases a vesico-vaginal fistula may subsequently form.

In the third stage of labour exhaustion of the uterus is certain to be followed by post-partum hæmorrhage. This is its most serious aspect.

DIAGNOSIS.

The delay due to an exhausted uterus might be mistaken for that due to a sluggish uterus, on which condition, as has been shown, it most commonly supervenes. Where exhaustion follows on previously strong uterine action, its occurrence could scarcely be overlooked, the pains becoming weaker and weaker during the course of labour until they cease altogether.

When, however, the pains have been sluggish from the start, there is a greater tendency not to notice their gradual diminution in strength, and the practitioner therefore should be particularly on the watch for that progressive decrease in the force and frequency of the uterine contractions that indicates the supervention of exhaustion.

TREATMENT.

Uterine exhaustion can in nearly all cases be prevented if the inadequacy of the uterus to fulfil its task be early recognised and properly treated.

First Stage.—It is unusual to see exhaustion in the first stage, and when so occurring it is generally a sequel to reflex nervous inhibition. The patient is therefore, as a rule, a primigravida. In many of these cases the cervix is rigid, and the membranes are prematurely ruptured. The proper treatment of this type of inertia has been described, see p. 291.

Exhaustion in the first stage is not, as a rule, a very serious phenomenon, except in so far as it causes trouble and anxiety by delay.

It should be treated by putting the patient to sleep, so as to give the uterus time to recover itself. To this end the combination of opium, chloral, and bromide of potassium, given on p. 292, is well adapted. When the patient wakes up, the contractions will begin again, when the labour should be conducted on the usual lines.

Occasionally, however, as in severe ante-partum hæmorrhage, exhaustion of the uterus in the first stage is a serious complication. A case of placenta prævia, or still worse, one of accidental hæmorrhage, in which with an imperfectly dilated os the uterus has from sheer exhaustion ceased to contract, constitutes about the most formidable conjunction of circumstances with which a practitioner can be faced.

In such a dilemma, every effort must be made to stimulate the uterus, both directly by pituitary extract, ergotin, and strychnine, and indirectly by alcohol, the ingestion of fluid nourishment, and the administration of saline solution by the rectum, subcutaneous tissue or veins. Meanwhile the treatment proper to the cause of the hæmorrhage must be carried out, see pp. 251 and 261.

Second Stage.—In the second stage the occurrence of exhaustion is generally a reproach to the practitioner if he has been in attendance through labour, because it implies that he has neglected to supply aid to an obviously overburdened uterus.

Pains still present.—Absolute exhaustion takes a considerable time to consummate, being preceded by a period during which the pains are steadily growing weaker and weaker, and in which the timely application of forceps or other measures of artificial delivery will be sufficient to conserve the remaining strength of the uterus for the demands of the third stage.

Pains absent.—If exhaustion is already complete, the extraction of the child by art is on no account to be performed, for by so doing

the practitioner would be directly courting the occurrence of post-partum hæmorrhage.

The proper treatment under such circumstances is to wait until the contractions begin again. In the meantime, the recovery of the uterus should be hastened by giving the patient nourishment, rest, and sleep.

The prescription given on p. 292 is admirable to this end. When the uterus again shows an inclination to contract, this may be accentuated by the use of pituitary extract. Directly the pains have become satisfactory, the child should be operatively delivered.

Third Stage.—In the third stage of labour, if exhaustion, complete or partial, is known to be present, the delivery of the placenta should be delayed as long as possible, pituitary extract, ergotin, and stimulants should be administered, and all the appliances necessary for controlling bleeding be placed at hand. For the rest, the reader may be referred to the section dealing with Post-partum Hæmorrhage, p. 271.

HYPERACTIVITY OF THE UTERUS.

Hyperactivity of the uterus may be considered under the heads of tonic contraction of the uterus and precipitate labour.

Tonic Contraction.

When an insuperable obstacle to delivery is present, the uterus in its efforts to surmount it may pass into a condition of continuous or tonic contraction.

The phenomenon in its fullest degree is not often seen in these days, because its occurrence implies a very neglected labour. In its lesser degrees, however, it is not uncommon. It is a very serious condition. The uterine contractions become increasingly frequent, and after each there is less and less relaxation, until finally a condition of permanent contraction without any relaxation is established.

The contractions, though excessively violent, are unable to force the child down, and the fundus of the uterus, therefore, remains at a constant level.

The muscle fibres of the upper part of the uterus, being not only more numerous but more powerfully enervated, are unable to contract at the expense of those of the lower part, which they elongate in the process. The lower part of the uterus, therefore, becomes progressively thinned, while the upper part retracts upwards to form a thick muscular cap over the upper part of the fœtal ovoid. This process, if persisted in, will eventually lead to rupture at the junction of the two portions.

The exact point of demarcation between the thinning "lower segment" and the thickening "upper uterine segment" is a dynamical one, and depends on the position of the obstruction, for below this point the wall of the genital canal is protected from tension by the impacted presenting part.

In most cases of seriously obstructed labour, the point of obstruction is at the brim, and hence the "lower segment" is entirely uterine.

Where, however, the obstruction is low down in the pelvis, the whole of the uterus forms the "upper segment," and the "lower segment" is composed of the stretched vagina above the point of impaction.

RESULTS.

When the Obstruction is at the Pelvic Brim.—The upper part of the uterus tends to tear itself off the lower part, and the rupture, when it occurs, affects the posterior or unsupported wall, and is usually circular in direction.

When the Obstruction is in the Pelvic Cavity.—The uterus tears itself off the vagina, the rent being situated posteriorly in the vaginal vault.

Most cases of tonic contraction untreated would probably terminate in rupture of the genital canal, as described above. The records of obstetricians of a hundred years ago show, however, that in some death was due to septic intoxication from wholesale sloughing of the soft parts, the patient being still undelivered.

SYMPTOMS AND SIGNS.

The condition of the patient when tonic contraction is established is grave. She is greatly distressed, the pulse is very fast, and the temperature high.

The abdomen is rigid and tender, and through the parietes can be seen the uterus tightly encasing the fœtus, whose grosser outlines are thus rendered abnormally visible, Fig. 69. In a typical case a circular depression, the ring of Bandl, can be seen demarcating the junction between the two segments. In many cases the distended bladder is visible, lying on the front of the projection caused by the head.

On vaginal examination, the vulva may be deeply cyanosed or even black, and is often excoriated as well, if prolonged attempts at delivery have been made.

The position of the presenting part will vary with the case, but

it is always immovably fixed. Frequently, the cord or the hand is lying prolapsed in the vagina.

The child is almost invariably dead.

DIAGNOSIS.

Tonic contraction practically never occurs until the membranes are ruptured. In most cases, the cervix is only partially dilated, because the obstruction is at the brim and the presenting part cannot descend to complete the dilatation.

The diagnosis depends upon whether the tonic contraction is established or is being established.

Tonic Contraction is established.—It is almost impossible to mistake this condition for any other if proper care is exer-

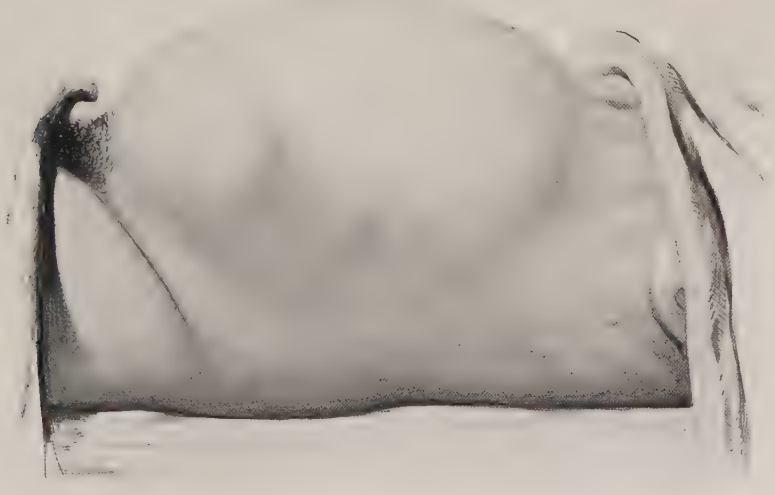


FIG. 69.—Appearance of the Abdomen in Advanced Tonic Contraction.

cised in the examination; but the following chief points of difference between uterine exhaustion and tonic contraction may be noted:

General Condition.—In uterine exhaustion the patient is tired and her pulse may be a little raised.

In tonic contraction the patient is anxious and restless, her pulse is rapid (120 or over), and her temperature raised.

Uterus.—In uterine exhaustion the pains became gradually less severe, the uterus is soft, and is not tender or contracted round the child.

In tonic contraction the pains become gradually more severe, the uterus gets continually harder, and is tender and contracted round the child.

In uterine exhaustion there is no ring of Bandl, and the round ligaments cannot be felt.

In tonic contraction the ring of Bandl is present, and the round ligaments may be felt standing out.

Cervix.—In uterine exhaustion the cervix is normal.

In tonic contraction the cervix is swollen and of a blue-black colour.

Vagina.—In uterine exhaustion there is nothing abnormal to be felt on vaginal examination.

In tonic contraction the vagina is hot and dry, swollen and discoloured, and may even slough.

Vulva.—In uterine exhaustion the vulva is normal.

In tonic contraction it is swollen, discoloured, and often excoriated from repeated attempts at delivery.

Child.—In uterine exhaustion the child is alive.

In tonic contraction the child is dead or dying.

In uterine exhaustion there is no caput succedaneum, and the presenting part is movable unless previously impacted.

In tonic contraction the presenting part is fixed, and there is a well-marked caput succedaneum.

Tonic Contraction is being established.—In its earlier phases, when the occurrence of contractions is becoming less striking because of the inter-contractile rigidity of the uterus, it is possible for this condition to be confused with the inception of uterine exhaustion.

Examination of the uterus and a consideration of the condition of the patient would prevent such a mistake being made.

In all prolonged labours a careful watch must be kept for the early signs of tonic contraction. Their appearance indicates that radical interference to procure certain and quick delivery is imperative.

TREATMENT.

The treatment of tonic contraction is summed up in the words "immediate delivery."

This must be carried out under full surgical anæsthesia, an injection of morphia, $\frac{1}{3}$ gr., having been previously administered.

Vertex Presentation.—If the head presents, it should be perforated and the cranioclast or cephalotribe applied. The life of the fœtus is a negligible quantity in these cases, even if it be still

surviving. To attempt delivery with forceps is strongly to be condemned; it will certainly fail, and merely increases the damage to the soft parts.

Breech Presentation.—If the breech presents, the leg should be brought down, providing this can be done without intra-uterine manipulation. This being impossible, the legs should be severed by scissors and extracted separately, after which the rest of the fœtus must be removed by embryotomy of the trunk and perforation of the head.

Shoulder Presentation.—In shoulder presentation the head should be decapitated, or if the neck cannot easily be reached, embryotomy should be performed, followed by spondylotomy if necessary. Any attempt at version will almost certainly produce a rupture of the uterus.

Under most exceptional circumstances it may be found impossible to deliver the fœtus through the vagina even after destruction of the head. In such cases the practitioner has no choice but to perform Cæsarean section, wholly unfavourable as the conditions are. That a good result to the mother is possible even in such straits is, however, proved by a case of this kind recorded by one of us in the "Archives of the Middlesex Hospital," Vol. XX.

Precipitate Labour.

CAUSE.

There are two varieties of precipitate labour:

1. That in which the expulsive forces are excessively powerful.
2. That in which the resistance to the passage of the fœtus is slight.

The first type is chiefly seen in vigorous young women, and the labour is short and acutely painful.

The second type is seen in multiparous women. The passages are wide and the child often below the normal size. In such the uterine contraction may be but very slightly painful, so that the first stage is consummated without the patient realising that she is in labour. On the membranes rupturing the child slips through the vagina often with a single uterine contraction.

RESULTS.

In the first type the child is driven so rapidly through the genital canal that severe lacerations of the cervix, vagina and perineum, and even rupture of the uterus may result. In addition, emphysema of the neck and chest sometimes occurs from the

severe straining efforts of the mother. Transitory mania resulting in the child being killed has also been known to occur.

The child itself is usually born unharmed because the pains are sufficiently violent to warn the patient of the impending birth, but cases have been reported in which the child's skull has been fractured when the mother has had a contracted pelvis. The child may also be partially asphyxiated from the continuous pressure. Post-partum hæmorrhage has been noted to follow this type.

In the second type the danger is chiefly to the child, who may be expelled on to the floor or into the pan of the water-closet, so that it is injured or suffocated. If the cord is short there is a possibility of uterine inversion.

TREATMENT.

Precipitate labour due to abnormal force of the uterus should be treated by light chloroform administration during the second stage, or by morphine-scopolamine narcosis; short of this the patient must be told to cry out, and must be prevented as far as possible from bearing down.

The second type requires no treatment, but the practitioner should bear in mind the possibility of a multiparous patient complaining of slight abdominal discomfort being actually in labour.

CHAPTER XX.

Labour Complicated by Anomalies of the Genital Passages.

Exceptionally pregnancy may take place in spite of the presence of marked stenosis of the vulva, vagina or cervix, or these parts may become entirely atresic during pregnancy.

VULVA.

The following conditions of the vulva may obstruct labour:

Rigid Perineum.

CAUSE.

Delay in the second stage of labour due solely to abnormal rigidity of the perineum is unusual. It is, of course, more frequent in primigravidæ, and in the elder more than the younger. It is at times due to the cicatrisation of former lacerations. More commonly the condition is relative to a degree of inefficiency on the part of the uterine contractions.

RESULT.

The danger of a ruptured perineum is enhanced.

TREATMENT.

The Application of the Forceps.—In such cases skilful forceps extraction under chloroform is probably the best way of "saving" the perineum. Where the latter is unusually rigid and long, special care must be taken to extract slowly and to keep the head well forward in the subpubic angle.

Epsiotomy.—In exceptional instances when it appears certain that the head cannot be born naturally without a severe rupture of the perineum, deliberate incision of the latter should be performed. The division should not be made in the middle line, but to one side of it. Anæsthesia is desirable, but not a necessity. Bilateral incision is preferred by some authorities. After the birth of the placenta, the perineum must, of course, be repaired.

Narrowing of the Orifice.

The vulval orifice may be very small congenitally, or its size may

be much diminished by sloughing and cicatrisation after a laceration at a former pregnancy; or in the operation of perineorrhaphy the deformity may be over-corrected with a similar result.

The labia may become adherent from injury or inflammation, while occasionally the hymen has escaped rupture, and at the

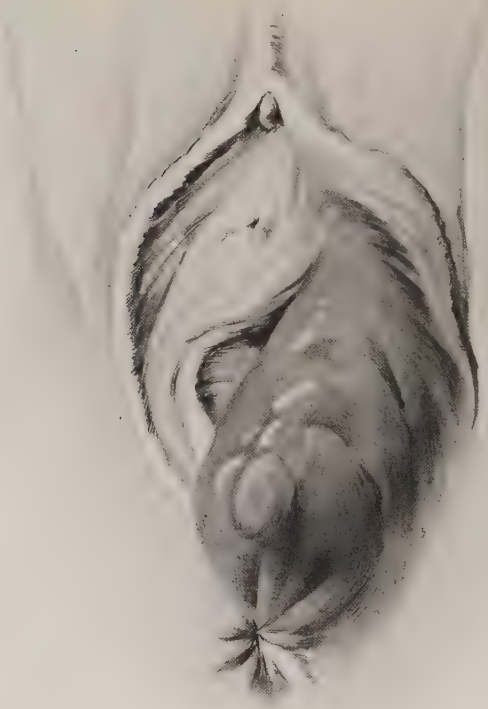


Fig. 70.—Hæmatoma Vulvæ.

end of the second stage has caused delay to the advance of the head.

TREATMENT.

The small orifice must be enlarged by suitable incision; the unruptured hymen should be treated in a similar way, and the adhesions of the labia separated manually.

Tumours of the Vulva.

The vulva may be the seat of a large Bartholin's cyst, a Bartholin's abscess, or a hæmatoma (Fig. 70).

RESULT.

Rarely obstruction may result, and in the case of a Bartholin's abscess the uterus may become infected.

TREATMENT.

The cyst should be incised, and after the puerperium radically dealt with; an abscess should be opened and its interior swabbed with pure carbolic acid, whilst the hæmatoma must be incised and the blood clot turned out, see p. 284.

After the child is delivered the cavity of the abscess or hæmatoma should be plugged with gauze.

Œdema of the Vulva.

Although we have never seen a case of œdema of the vulva actually delay labour, on two occasions we have seen patients during the week before labour with the vulva so swollen from œdema that the opposing labia were sloughing from mutual pressure, and a vaginal examination was practically impossible.

TREATMENT.

The treatment we employed of multiple incisions with hot fomentations successfully relieved the swelling, so that the children were born without difficulty.

VAGINA.

The following abnormal conditions may be present in the vagina, and cause an obstruction to labour:

Congenital Septa.

If any portion of the Mullerian ducts fails to fuse, or fusing fails to coalesce with the urogenital sinus, a septum remains; in the first case, parallel to the longitudinal axis of the vagina; in the second case, transverse to its longitudinal axis.

Longitudinal Septum.—The longitudinal septum may be complete or incomplete. This gives rise to the deformity of a double vagina, and is generally an indication, but not always, that the uterus is also double.

RESULT.

If the septum is complete, and both vaginal orifices patent and the uterus is double, no trouble, as a rule, occurs during delivery as

far as the vagina is concerned, the child being expelled from the uterus into the corresponding vagina, and so born.

If, however, the uterus is single and the septum does not extend right up to the cervix, the child's head may catch on the septum and its further progress be delayed; or it has happened that when the child has presented by the breech, a leg has come down on each side of the septum, the child thus riding on the septum and its advance likewise hindered (Fig. 71). Similar difficulties may also arise if the uterus is double, but the septum incomplete.

Fig. 71.—Obstruction by Vaginal Septum.

Further, it has happened with an incomplete longitudinal septum and a transverse septum lower down affecting only one of the vaginæ, so formed, the child has been expelled from the uterus into the cul-de-sac of the occluded vagina, and obstruction has resulted. In some cases the septum has been broken down by the uterine contractions, and the child born without help.

Transverse Septum. — The commonest site for this septum is just above the hymen. If it is complete, obviously the woman cannot become pregnant, but occasionally a septum has been found perforated in its centre which has not interfered with impregnation, but which has obstructed labour and required division before the child could be delivered.

It is possible that the practitioner might mistake the transverse septum, if it was high up, for the roof of the vagina and the perforation for the cervical canal, as happened in one of our cases.

TREATMENT.

If a longitudinal septum is delaying the advance of the child it must be divided, and if in addition a transverse septum is present,

that, of course, will have to be incised. Hæmorrhage does not result from this treatment at the time, the pressure of the child effectually controlling it. Any serious hæmorrhage after the birth of the child should be treated by the application of sutures, failing which, or until the sutures can be inserted, the vagina must be plugged.

Absence of the Vagina.

The vagina may be absent in part or whole, and in either case it would seem impossible that the woman should become pregnant when thus afflicted.

It has, however, happened that a woman aged twenty-three without a vagina has conceived and aborted a fœtus over 4 in. long. Her cervix opened into the bladder, and intromission had been accomplished per urethram.

TREATMENT.

This case is likely to remain unique. The appropriate treatment would be a Cæsarean hysterectomy.

Vaginismus.

Spasmodic reflex contraction of that portion of the levator ani encircling the vagina, if at all marked, is usually sufficient to prevent fertilisation. Not always, however, and in such a case the presence of the head in the vagina has set up such powerful contractions that its further progress has been entirely arrested.

TREATMENT.

When the patient is put under full surgical anæsthesia the spasm usually relaxes and the child is born without further assistance. Manual dilatation may be required in addition.

Cicatrices and Adhesions.

Adhesions and cicatrices may result from inflammation due to puerperal sepsis or the acute specific fevers; to injury during a previous labour; to the results of plastic operation upon the vagina, or to syphilis.

RESULT.

In many cases the advancing child is able to break down the adhesions or stretch or tear the cicatrices. The damage, however, thus accomplished may be very extensive, fistulæ being formed or the tissues severely lacerated, causing hæmorrhage, and subjecting the patient to the risk of puerperal sepsis later.

If the atresia is marked, the most severe obstruction may result;

the worst cases have been associated with vesico-vaginal or recto-vaginal fistulæ.

TREATMENT.

The practitioner will have to use a good deal of discretion when treating these cases. If the atresia is so great that to relieve it by the necessary incisions would mean the danger of seriously wounding the bladder or rectum, Cæsarean section is the proper treatment.

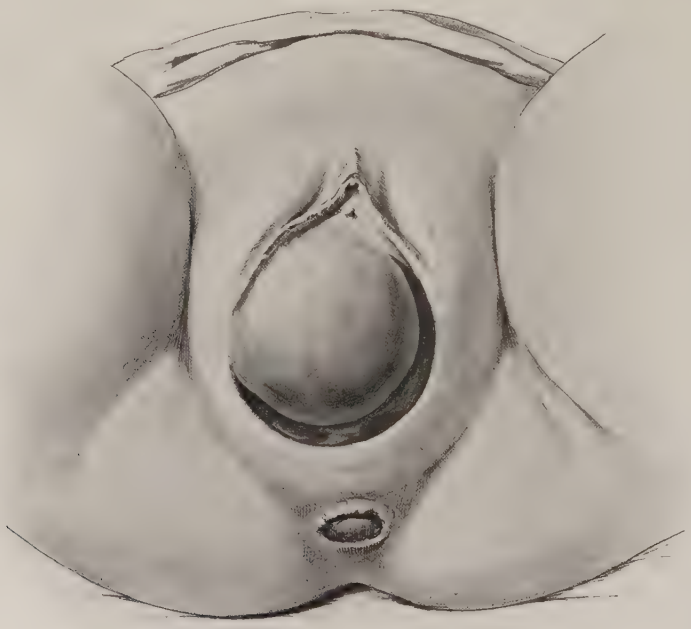


FIG. 72.—Obstruction to the Birth of Child by a Vaginal Cyst.

Short of this, the practitioner may wait and see whether the obstruction yields to the advancing child, and if not, he may by dilating with his fingers or by very careful incisions (especially when the cicatrix is on the anterior or posterior wall of the vagina) endeavour to overcome the obstruction.

Vaginal Tumours.

Tumours of the vagina may be either cystic or solid, and the latter may be malignant (carcinoma, sarcoma) or innocent (myoma, fibroma, or hæmatoma) (Fig. 72).

RESULT.

The tumour may cause obstruction, or the child may squeeze past it, or in the case of the cystic tumour, it may burst and allow the birth of the child. If the cystic tumour is suppurating, as it may be, the risks to the mother are correspondingly increased.

TREATMENT.

If obstruction results, the tumour, if solid, should be enucleated, where this is easily possible, as in the case of a myoma. Cystic tumours should be punctured and radically dealt with after the delivery of the child. Malignant tumours, or any other growth that cannot be easily removed, necessitate Cæsarean section. Hæmatoma of the vagina causing obstruction during delivery is rare, see p. 284. The mucous membrane covering it would have to be incised and the clot turned out.

If the patient is seen before labour and the tumour is easily removable, an operation to this end should be performed. We have thus successfully treated vaginal cysts. If the tumour is inoperable or the operation likely to prove difficult, the question of Cæsarean section must be carefully considered.

Prolapse of Vaginal Walls.

If the vaginal walls of a pregnant woman become prolapsed and are allowed to remain so, they hypertrophy, and, towards the end of pregnancy and during labour, they become œdematous from increasing pressure.

Under such conditions, labour may be somewhat delayed.

TREATMENT.

Empty the bladder and push the prolapsed vagina back over the advancing part, terminating labour by forceps if necessary.

CERVIX.

The cervix may be a cause of obstruction on account of hypertrophy, of rigidity either spasmodic or organic, or of œdema.

Hypertrophy.

This condition has been discussed, p. 160. The enlargement when inflammatory may be associated with much organic rigidity, see p. 302.

Spasmodic Rigidity.

SYMPTOMS AND SIGNS.

There are two distinct degrees or varieties of spasmodic rigidity of the cervix, one common and slight, the other rare and severe.

Common and Slight.—This degree of spasmodic rigidity is common in first labours, especially in association with that type of uterine sluggishness which we have termed "reflex," see p. 289. If the membranes rupture prematurely, or are so adherent over the lower uterine segment that they will not separate to form the "bag," the most efficient dilator of the cervix is absent and any tendency to spasm is accentuated.

Rare and Severe.—Rarely, however, the complication is so marked as to give rise to actual obstruction, and the condition of the patient may become serious before she is relieved.

When such is the case, it will be found that the spasmodic rigidity is not confined to the external os, but affects more or less that portion of the uterus below the presenting part. The cervix is funnel-shaped, and has the feel described by French obstetricians as resembling greased leather. The presenting part is unable to come down to dilate the external os.

Uterine contractions are present, but they are irregular, inefficient and coliky in nature, and lead to exhaustion of the patient.

Eclampsia, when severe, is associated with a similar serious rigidity of the cervix. Some years ago we met with a case in a primigravida a little before term, where the spasm of the cervix was so marked that it was absolutely impossible to pass any but the smallest sizes of Fenton's metal dilators.

TREATMENT.

Common and Slight Variety.—The rectum and bladder having been emptied to remove these sources of reflex irritation, and the membranes over the lower uterine segment having been separated if necessary, an excellent treatment is to put the patient under anæsthesia for fifteen or twenty minutes, during which the cervix will often be found to dilate rapidly, and if necessary this dilatation can be gently encouraged manually.

Scopolamine-morphine analgesia often gives excellent results in these cases.

Various other methods may be tried. Thus vaginal douches with hot water, of a temperature not exceeding 110° F., sometimes relaxes the spasm. Painting the cervix with a 10 per cent. solution of cocain, or inserting a plug of gauze soaked with this solution into the cervical canal, may be tried, or the patient may be given a mixture containing 20 gr. each of potassium bromide and chloral, these drugs or morphine-scopolamine being especially indicated if the patient is nervous, or the uterine contractions are unduly painful.

Rare and Severe Variety.—None of the above measures have any

effect on this variety, the condition being a very troublesome one to treat. When it is recognised, the cervix should be at once artificially dilated or otherwise enlarged.

The best method of dilating the cervix in these cases is by de

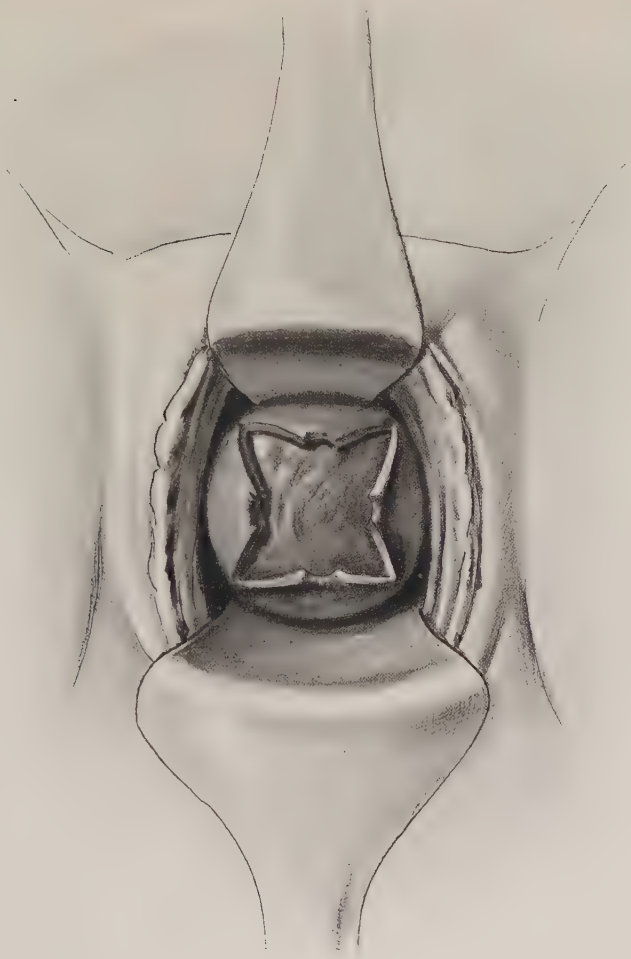


Fig. 73.—Radial Incision of a Rigid Cervix.

Ribes' bag, but even this sometimes fails, as in a case under our care where, though the bag was expelled and the cervix lacerated during its expulsion, the cervix contracted again, and the obstruction continued, labour having to be terminated by manual dilatation and forceps.

If the de Ribes' bag fails, and the cervix is not sufficiently dilated for the use of forceps, it must be enlarged by a metal dilator, by multiple cervical incisions obliquely placed to avoid the uterine vessels (Fig. 73), by vaginal Cæsarean section, or by abdominal Cæsarean section.

Multiple cervical incisions are not always successful, and in one of our cases, in spite of this operation, the head had to be perforated to deliver it. It is of interest to record that this patient had no return of the cervical spasm with her second labour.

We prefer vaginal Cæsarean section to multiple cervical incisions, especially in patients before the eighth month of pregnancy; after this time abdominal Cæsarean section is probably the best.

If the child is dead, and it is possible to dilate the cervix sufficiently, the head should be perforated.

Organic Rigidity.

CAUSES.

Pathological induration of the cervical tissues may be due to several conditions:

Scar tissue, the result of caustics applied to the cervical canal; of operative procedures upon, or of extensive syphilitic ulceration in, the cervix; or of its laceration at previous labours may so occlude the external os that its situation is with difficulty identified.

Some of the worst cases have followed amputation of the cervix for hypertrophic elongation or carcinoma.

Long-standing chronic cervicitis produces a diffuse fibrotic hardness which is sometimes, though rarely, sufficient to cause difficulty in labour. This is the case more especially when it is conjoined with hypertrophic elongation of the cervix, either of the vaginal portion or of the supra-vaginal portion in cases of prolapse, when considerable delay in the first stage may be occasioned.

Of new growths, fibroids are the chief cause of severe and insuperable rigidity, carcinoma, owing to its friable nature, giving rise to much less obstruction than might at first be thought.

Patients are sometimes encountered in whom the vaginal cervix is absent, and the cervical canal extremely narrow. In other cases an exaggerated form of conical cervix and "pin-hole" os may be present.

TREATMENT.

Organic rigidity of the cervix in labour must be treated according to its nature and the degree of obstruction.

Patience should be exercised in many of these cases, especially

when the rigidity is due to inflammation and atresia, since it often relaxes as time goes on, and there is no need for any active interference.

Hypertrophy of the cervix, inflammatory or simple, see p. 160, though occasioning delay, is apparently never insuperable. Dilatation in these cases may be hastened by the use of de Ribes' bag, or in more obstinate instances, by incision.

Rigidity due to new growth is best treated by Cæsarean section.

Congenital narrowing can usually be efficiently treated by dilatation, although it may require Cæsarean section, a case of this latter nature being thus dealt with by a colleague of ours a few years ago.

Attempts to forcibly drag the head past the obstruction are fraught with risks of extensive rupture of the lower segment at the time, and puerperal infection afterwards.

The treatment of atresia due to scarring depends upon its severity. It may be sufficient to gradually dilate up with Fenton's dilators until a de Ribes' bag can be inserted, or it may be necessary to perform Cæsarean section; this operation has been required after amputation of the cervix both for hypertrophy and carcinoma.

ŒDEMA OF THE CERVIX.

CAUSE.

Excessive œdematous swelling of the cervix may occur during pregnancy either as a part of prolapse of the uterus, see p. 160, or very rarely for no apparent reason. During labour the anterior lip may be nipped between the head and pelvis and swell greatly. Following labour, œdema may result from injury during delivery. During labour, the progress of the child may be impeded, the anterior lip which is usually alone affected being pushed down in front of the presenting part as a purple-red, soft mass. Hæmorrhage may take place into the cervix and a post-partum hæmatoma result.

DIAGNOSIS.

The protrusion has been mistaken for the anterior or posterior vaginal wall, or a tumour pushed in front of the head of the child. After delivery the pendulous lip has been mistaken for a torn-up portion of the posterior vaginal mucosa, and as such has been sutured on to the perineal skin.

TREATMENT.

The treatment of œdema associated with prolapse during pregnancy is described on p. 161. For the sudden œdema during pregnancy, recumbency is indicated. If delay is occasioned during labour the

œdematous lip should be pushed up over the head by a "prizing" movement, the finger-tips acting as the fulcrum of the lever (Fig. 74). If this is not successful, and the head fails to pass the obstruction (which it generally will), forceps must be applied.

OBSTRUCTION TO DELIVERY DUE TO A UTERINE CONTRACTION RING.

In this condition, which is a rare one, a narrow band of circular

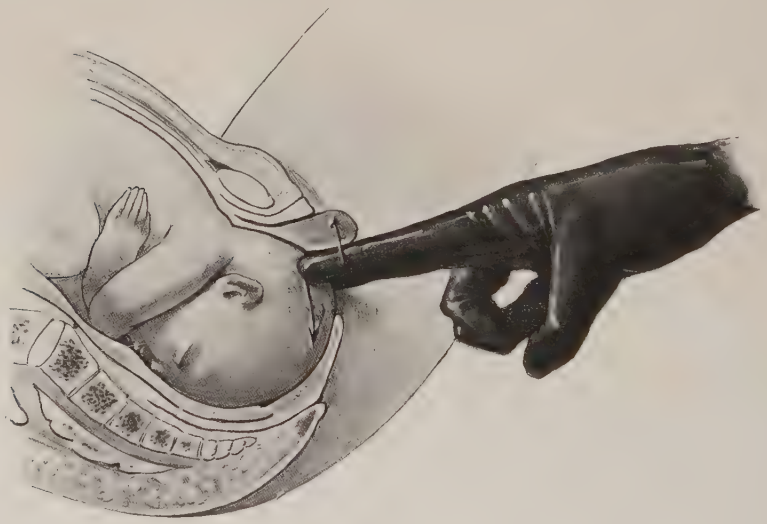


FIG. 74.—Pushing the prolapsed and swollen Anterior Lip of the Cervix above the Occiput.

muscle fibres in the lower part of the uterus becomes spasmodically contracted and so prevents the birth of the child.

CAUSE.

In most of the reported cases the complication appears to have followed some abnormal presentation of the child, such as an oblique position or prolapse of the foot by the head, and it may be that in some cases the efforts to correct the misplacement has originated the spasm.

SYMPTOMS AND SIGNS.

Labour has been a little prolonged and there is generally some malpresentation. On abdominal examination the contraction ring can be detected running across the uterus, and above it, and sometimes below it, the uterus can be felt to become hard with the pains

and soft in the intervals, the contraction ring remaining hard all the time.

An example of this complication occurred in the practice of one of us; the child was in an oblique position, the neck was high up, and although the upper part of the uterus relaxed quite well between the pains, version could not be performed. The child was therefore decapitated. On a further examination being made with a view to delivering the head, this was found to be imprisoned by a contraction ring in the lower part of the uterus, and it was only extracted with great difficulty by cranioclasm, the upper segment of the uterus contracting and relaxing normally during delivery.

DIAGNOSIS.

The "contraction" ring under discussion must not be confounded with the "retraction" ring, sometimes called Bandl's ring, associated with tonic contraction of the uterus, in which the upper segment of the uterus above the ring remains permanently contracted.

TREATMENT.

If the child is alive the best treatment is to deliver it by Cæsarean section. If the child is dead and lying in the longitudinal axis of the uterus, a trial may be made to deliver it with continuous traction by means of the cranioclast applied to the head, to which is attached an 8-lb. weight by a cord, which is then hung over the foot of the bed, as was successfully accomplished by Willett, or if it is a breech presentation, by applying the cord and weight to the legs.

Division of the ring or delivery by forceps-traction has resulted in rupture of the uterus.

As an alternative to traction the head may be crushed or embryotomy performed.

Choloroform has no effect in relaxing the spasm.

CHILDBEARING IN ELDERLY PRIMIPARÆ.

In our experience the course of pregnancy, labour and the puerperium in a woman over thirty years of age differs but little from that in one under thirty. At the most labour is a little prolonged and the necessity for operative delivery is rather more frequent, whilst if the patient is over forty and has only recently married, the vaginal canal and vulval orifice will probably be a little contracted from age changes, and the risk of laceration will therefore be somewhat increased.

The frequency of albuminuria is stated to be a little higher, and the proportion of male children over female is increased. From time to time communications are made to the medical press on the

subject of childbearing in elderly primiparæ, from a study of which it would appear that labour is more prolonged, that the necessity for instrumental delivery is greatly increased, and that the percentage of still-births is considerably raised. Those observers, however, who have been very careful to eliminate all cases of pelvic deformity and other abnormalities which may occur just as frequently in young primiparæ have arrived at the conclusions given above.

CHILDBEARING IN YOUNG PRIMIPARÆ.

Gache[1] has collected ninety-one cases of childbearing in girls between eight and sixteen, and these include one eight years old, three nine years old, one ten years, two eleven years, three twelve years, and seven thirteen years of age.

The youngest mother on record lived at Oberpallen in Belgium. She was eight years old and her case was reported by Molitor. Ketchum reports an example of a grandmother aged twenty-five years nine months.

He concludes that girls between thirteen and sixteen years are not more exposed than others to the complications of pregnancy. Between fourteen and sixteen labour was generally normal and rarely prolonged.

The average duration of labour under fourteen years of age was thirty-four hours and the percentage of instrumental deliveries was higher than normal.

In eighty-five the presentation was vertex, in five breech, and one miscarried. Forceps were necessary six times, three for slight pelvic contraction and three for some prolongation of labour. Lacerations of the genital canal were rare and healed rapidly.

The average weight of the children was at thirteen years of age 6 lb. 3 oz., at fourteen years of age 6 lb. 9 oz., at fifteen years of age 6 lb. 6 oz., and at sixteen years of age 6 lb. 12 oz.

OSTEO-MALACIA.

CAUSE.

This interesting disease is very rarely met with in Great Britain, though it appears to be more common in certain parts of the Continent.

Although mollities ossium affects men as well as women, it is found to be peculiarly associated with women of a childbearing age, and more especially with multigravidæ. Its essential feature is the

[1] *Travaux d'Obstétrique*, 1909.

softening of the bones from withdrawal of lime salts, leading to great deformity, and especially affecting those comprising the pelvis.

SYMPTOMS.

The symptoms usually come on insidiously. One, two or more previous pregnancies with aching pain in the limbs and spine, suggestive of chronic rheumatism, may be described by the patient. It is first noticed that the patient is becoming shorter, owing to bending of the spine and the bones of the leg. The deformities steadily grow worse, and the patient becomes progressively weaker and has increasing difficulty in walking, till at last in extreme cases she becomes bedridden.

SIGNS.

The bones of the legs and arms, the clavicles and the ribs are all distorted. The curvature of the spine brings the thorax down towards the pelvis, and the enlarging uterus interferes gravely with the action of the diaphragm. The softened state of the ribs prevents proper use of the intercostal muscles, and respiration becomes increasingly difficult.

The pelvic deformity is characteristic, for, owing to the sacrum and spine being driven forwards and the acetabula being driven inwards, both the inlet and outlet of the pelvis are markedly diminished. The pelvis is described as "tri-radiate" owing to the shape of the brim produced by the softening, or "beaked" owing to that portion of the pelvis in front of the acetabula being crushed together in the form of a beak. The inlet may become so contracted that the available conjugate diameter may measure less than one inch.

The disease may at times come on acutely. In other cases it recurs, or exacerbates with each pregnancy.

DIAGNOSIS.

Obscure pains in the limbs and spine in a pregnant woman, especially if associated with increasing weakness of the limb muscles, a pronounced stoop and loss of height, should awaken suspicion. The pelvis should be examined for the characteristic deformity, and the state of the bones generally should be investigated by the X-rays. The malacosteon pelvis has to be diagnosed from the pseudo-malacosteon pelvis, a deformity of a somewhat similar though not so marked character, due to rickets occurring late in childhood. In this case there is the history to be considered, the presence of other signs of rickets, and the fact that the interspinous diameter is the same size as the intercristal, whereas in the

malacosteon pelvis it is smaller. The bones also are not soft in the ricketty variety.

TREATMENT.

Removal of the ovaries is stated to arrest the disease as a rule. If the condition is only slight, after the child is born the ovaries should be removed. If the case is severe and the pregnancy be early, subtotal hysterectomy and double oöphorectomy should be performed irrespective of the gestation. On the other hand, if the child be viable, it should first be delivered by Cæsarean section.

If viability be due in a few weeks only and the condition of the patient warrants it, the operation may be delayed so as to obtain a living child.

Owing to the softness of the bones, it has been found possible in some cases to enlarge the pelvis manually to a sufficient size to abstract the child by the natural passages. The practice is not, however, to be commended.

KYPHOSIS.

CAUSE.

Extreme kyphosis is most commonly due to old tubercular disease of the lumbar spine which has occurred so low down that no compensatory lordosis was possible. Occasionally it is seen in an exaggerated case of static deformity, or may be secondary to such diseases as osteitis deformans or osteo-malacia.

SIGNS.

A patient suffering from extreme kyphosis is seriously affected by the occurrence of pregnancy, because the lower ribs are so crowded downwards that the uterus as it ascends embarrasses the action of the diaphragm and intercostal muscles.

Kyphosis, when excessive and situated low down, produces a typical pelvic deformity, see p. 408, but this is not of such a nature as to seriously obstruct labour.

TREATMENT.

Every case must be considered on its own merits. In a patient who is able to rest and can be properly supervised, the gestation may sometimes be allowed to continue until viability is reached. Induction is then, as a rule, called for, but this is a matter for the practitioner's discretion, and depends upon the amount of lung embarrassment present.

In working women who cannot afford to lay up, the disability of

increasing shortness of breath is earlier felt. Such cases present a livid tinge, and the respirations are greatly distressed.

Most of these cases if left unrelieved would miscarry spontaneously.

In such it is therefore desirable to terminate the pregnancy either by direct operative evacuation or by induction.

It is worthy of note that a large proportion of these unfortunate women are illegitimately pregnant, having been seduced under circumstances of exceptional baseness.

LABOUR AFTER PLASTIC OPERATIONS ON THE VAGINA AND CERVIX.

When a woman who has previously had some plastic operation performed on the vagina or cervix becomes pregnant two questions will arise :

1. As to the effect the operation will have on the course of the labour, and

2. The extent to which labour will undo the result of the operation.

In regard to the first question it is obvious that each case must be considered on its own merits. In general it may be said that previous amputation of the vaginal cervix would appear to bring with it a distinct tendency towards abortion, and that in the event of the pregnancy going to term difficulty in the dilatation of the cervix sometimes occurs. In estimating the last possibility the nature of and the result achieved by the operation must be taken into account. Thus, if the cervix has been amputated high up, and particularly if a hard cicatrix has been left in the vaginal vault, the chances of obstruction occurring are definite, whilst if the conformation of the parts has not been markedly altered from the normal no such effect need be anticipated.

Previous repair of a cervical laceration (Trachelorrhaphy) does not appear to have any effects either towards promoting abortion or causing obstruction in labour. Colporrhaphy and Perineorrhaphy by narrowing the vagina will, of course, render the descent of the child's head less easy, but unless the narrowing has been extreme no serious obstruction will occur.

Turning to the second question, it is again true that each case must be judged on its own merits. Speaking broadly, it may be asserted that more or less tearing of the previously sutured parts is probable, and that where such suturing was carried out on an extensive scale to rectify marked displacement or deformity recurrence of the previous condition in more or less degree after the labour is certain.

The course to be pursued when a woman who has successfully undergone an extensive operation for some variety of "prolapse" again becomes pregnant requires careful thought. Three alternatives must be considered:

1. To induce abortion or operatively empty the uterus in early pregnancy.

2. To allow normal labour at term and subsequently repeat the plastic operation as far as may be needful.

3. To perform Cæsarean section at term and sterilise the patient if both she and her husband desire it.

Evacuation of the uterus has the disadvantage of sacrificing the child, and moreover by reason of the narrowness of the vagina or the absence of a vaginal cervix it may be attended with more than usual risk and difficulty.

Labour at term may be accompanied by obstruction, the degree depending on the state of the parts. In any event a rather more difficult delivery than normal is to be expected. To this risk has to be added the risk of a subsequent repetition of the plastic operation.

Cæsarean section, if carried out by expert hands under favourable circumstances and at the time of election is an operation of very little danger. The life of the child is practically assured, and no further plastic operation will be needed. On the other hand, if the operation cannot or is not likely to be carried out in the manner stipulated, it becomes a proceeding of distinct risk and should not be entertained.

We are of opinion that in cases where delivery at term by the natural passage is likely to be harmful to the woman either on account of obstruction or subsequent return of a serious deformity or displacement the best course is to perform Cæsarean section if this can be done with the proper safeguards.

CHAPTER XXI.

Labour Complicated by Malpresentation of the Child.

UNREDUCED OCCIPITO-POSTERIOR PRESENTATION.

In a third or fourth vertex presentation the occiput, instead of rotating forwards three-eighths of a circle, may rotate one-eighth backwards. The result of this, if the malposition be not rectified, is that, instead of the suboccipito-bregmatic diameter distending the vulva, as it does when the head is born by extension in normal labour, the occipito-frontal measuring three-quarters of an inch more will distend it, the head being born by flexion. In other cases, although the occiput does not rotate backwards, it remains stationary in the oblique diameter, with the occiput posterior.

RESULT.

There will be a marked delay in the birth of the child.

The perineum will be ruptured, and if good moulding has not taken place, badly ruptured.

The child is more likely to be born dead from prolonged pressure or the manipulation required in its delivery.

CAUSES.

The cause of this malposition is deficient flexion of the fœtal head. This deficient flexion may be due to

(*a*) Extension of the fœtal spine, due in its turn to the maternal spine pressing against it when the back of the fœtus is posterior to start with. Owing to this, the head becomes extended and the forehead may be well in advance of the occiput, in which case the pelvic floor rotates it forwards.

(*b*) As the head enters the pelvis, with the occiput posterior, the biparietal diameter, which is the broadest transverse diameter of the fœtal head, will be lying backwards in a part of the pelvis where there is least room, whilst the bitemporal diameter will be lying forwards where there is most room. The head will be gripped more tightly, therefore, at the biparietal diameter, which is situated posterior to the fœtal spine. As the direct uterine force is applied along the fœtal spine, that part of the head most loosely engaged

will be driven downwards, so that the forehead becomes lower than the occiput, with the same result as mentioned in (*a*).

(*c*) If the head is larger than normal or the pelvis smaller than normal, then the occiput as it enters the pelvis posteriorly will press tightly against the posterior inclined plane, which will direct it backwards into the hollow of the sacrum.

(*d*) If the fœtal head is small, it may slip through the brim before it has become flexed. That this is not an uncommon cause of unreduced occipito-posterior position is seen from the fact that in nearly 50 per cent. of these cases the head is smaller than normal.

DIAGNOSIS.

The diagnosis may be made by abdominal and vaginal examination.

Abdominal Examination.—If on abdominal examination the limbs of the child are felt well to the front and much more easily than usual, whilst the back cannot be felt well and is turned towards one or other flank, this is an indication that the occiput is lying posteriorly, a supposition further enhanced if the fœtal heart cannot be heard at all, or only faintly towards the loin.

Vaginal Examination.—On vaginal examination the position of the occiput can be determined by the fontanelles, by the moulding of the head, and by the ear.

Fontanelles.—The anterior fontanelle will be easily felt on the right or left as the case may be and pointing forwards, whilst the posterior fontanelle can only be reached with difficulty, this, of course, being opposite to what usually obtains.

Moulding of the Head.—It may be that, owing to the prolonged moulding and pressure, the caput succedaneum will prevent the fontanelles being felt, in which case the moulding of the bones may help in the diagnosis, for if it be remembered that the occipital bone is depressed below the two parietals in the moulding, then if one bone is felt overlapped by two, the practitioner will recognise that this is the occiput.

Again, the two frontal bones are depressed below the two parietals under similar circumstances, so that, if two bones are felt to be overlapped by two others, the position of the frontal bones will be determined.

The Ear.—If this overlapping of the bones cannot be detected, then the practitioner must pass his hand into the vagina and feel for an ear, the free border of which will indicate the direction of the occiput.

TREATMENT.

Leave the case as long as possible, as a large proportion of occipito-posterior positions eventually become normally converted. The practitioner should wait until there are signs either in the mother or child that labour should be terminated.

So long as the head is lying in the oblique diameter, and particularly if it is descending with the pains, there is a good possibility of its eventually rotating forwards. If, on the other hand, there is no descent, and particularly if the occiput has actually rotated into the hollow of the sacrum, it is useless to wait any longer for spontaneous rectification.

Under these circumstances there are four methods of dealing with this complication: To flex the head; to rotate the head; to pull on the head; to perforate the head.

Flexing the Head.—As we have seen, this complication is due to the fact that the head for some reason or other has been improperly flexed. It would appear, therefore, that if one could flex the head, the difficulty in delivery would be overcome. Whilst such a method of treatment is correct in theory, as a matter of fact, when one comes to put it into practice, it is disappointing, and, as a rule, one finds one is unable to cause flexion.

The method is carried out as follows: During a pain, the forehead is pressed up with the fingers of the right hand. In the interval of a pain an endeavour may be made to pull down the occiput.

Rotating the Head.—The head may be rotated with the hands or with the forceps. We prefer to use the hands; forceps, even if they were as efficient, have many disadvantages, for the soft parts may easily be injured unless the greatest care is taken. Further, unless straight forceps are used, that is to say, a pattern which is almost obsolete and not likely to be found in any practitioner's bag, they would have to be taken off and reapplied, supposing it was desired to deliver by traction after the rotation.

The method of rotating the head is as follows: The patient having been anæsthetised is placed on her side with her legs drawn up and separated, the right hand is passed into the vagina and grasps the head. The head is then, if possible, pushed out of the pelvis, after which it is rotated, while at the same time the left hand over the abdomen pulls round the anterior shoulder (Fig. 75). This rotation of the body is a very important part of the manœuvre, for it will be found that if the head is rotated alone, the occiput will probably return to its old position directly the head is released. If the shoulders of the child cannot be turned by external manipulation, the hand in the vagina should be passed up above the head and the trunk

of the child directly rotated. If, however, this is impossible, the occiput may be held forwards whilst the forceps are applied.

Pulling on the Head.—The particular danger of delivering the unreduced head with forceps is extensive laceration of the perineum, especially in the case of primigravidæ. If, however,

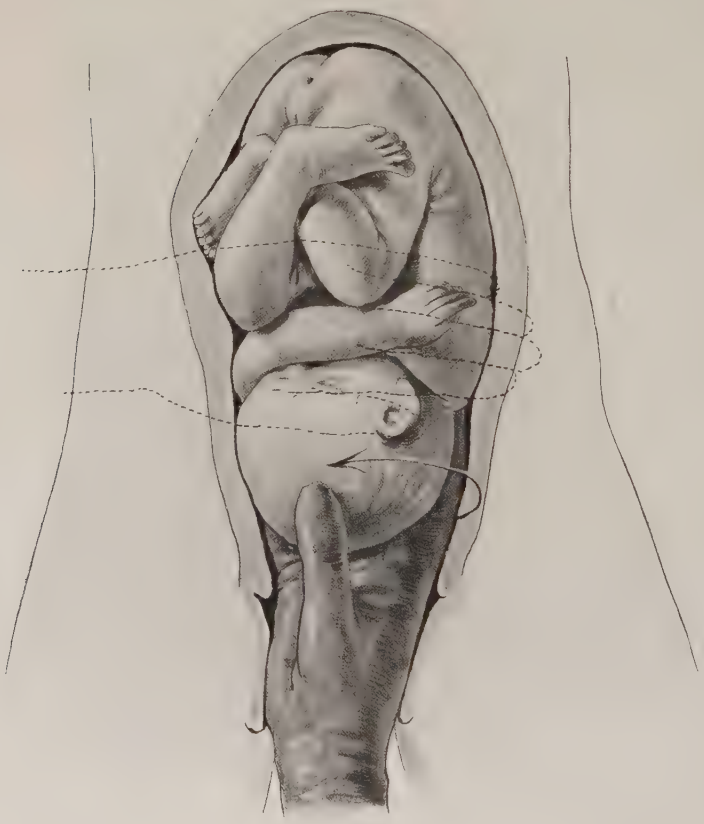


Fig. 75.—Unreduced Occipito-posterior Presentation. Rotating the Head.

axis-traction forceps are used, it is just possible that this injury may be escaped, since, owing to the universal joint in the traction handle and the fact that the handles are free, the occiput may rotate forwards as the head is pulled down.

In delivering a head with the occiput posterior, one should be particularly careful to bring the handles of the forceps well forward so as to flex the head to the greatest possible extent, the worst

lacerations being produced when the nature of the presentation has escaped detection.

Perforating the Head.—Perforation of the fœtal head when the child is living can be but rarely required in occipito-posterior presentation providing that the pelvis is normal. Under exceptional circumstances, it is the proper course, namely, when with an unusually large head it is found impossible to deliver without using an improper amount of force.

If the child is dead before delivery is essayed, the proper treatment is to perforate the head, which, reduced in size, can then be easily extracted.

FACE PRESENTATION.

Face presentation occurs in about 4 per 1,000 deliveries. There are so many abnormal conditions associated with, if not actually causing, a face presentation, that the practitioner, when he encounters a presentation of this variety, should quickly run over in his mind these various complications, and examine the patient carefully to see if one or other is present.

CAUSES.

The causes of face presentation may be divided into four groups:

1. Occipito-posterior positions.
2. Malposition of the uterus.
3. Contracted pelvis.
4. Abnormality of the child.

Occipito-posterior Positions.—Occipito-posterior positions are a cause of face presentation, the imperfect flexion common in these positions passing into complete extension.

Malposition of the Uterus.—If there is right lateral obliquity, and the back of the child is anterior and to the right, then the direct uterine force acting through the spinal column of the child will tend to press downwards the chin, and thus cause extension of the head.

The same will obtain if there is left lateral obliquity, with the child's back to the left.

In multigravidæ the abdominal walls are apt to be lax, and thus by not keeping the uterus in such fixed position lateral displacement of the organ is encouraged. Hence face presentation is commoner in multigravidæ than in primigravidæ.

Contracted Pelvis.—Face presentation may also be caused by a flattened pelvis either of the ovate or of the reniform variety. In the first case, if the head enters the pelvis with the occiput pointing

backwards, the biparietal diameter will be more tightly gripped than the bitemporal, with the result that the direct uterine force, acting through the fœtal spine in front of the point of greatest resistance, pushes the head downwards, and so it becomes extended and a face presentation results, in which position it passes through the brim.

In a reniform pelvis, if there is sufficient room for the occiput to rotate backwards, the biparietal will be to one or other side of the conjugate, in which case flexion will take place. If, however, there is not sufficient room for this, then extension will occur.

Abnormality of the Child.—If the head of the child is somewhat larger than normal it may be unable to enter the pelvis, and extension may result.

Dolicho-cephalus has been accounted as a cause of face presentation. This shape of the head is the result of face presentation and not the cause. Again, the development of the head may be at fault, resulting in that condition where the vault of the skull is missing, known as anencephalus. These monsters always present by the face.

A tumour of the thyroid gland will prevent flexion of the head, as also will the umbilical cord coiled round the neck of the child.

In some cases the cervical muscles are found at birth to be in a state of tonic contraction; this will, of course, cause extension of the head.

In hydramnios the rush of liquor amnii on the membranes rupturing may cause some extension of the head, and once this has begun, it may continue till face presentation results.

Of all these complications obliquity of the uterus, flattened pelvis, and hydramnios are those most often encountered, and the practitioner would do well to remember this.

DIAGNOSIS.

Abdominal Examination.—On palpating the abdomen by the usual methods it is found that the head is above the brim at the commencement of labour, even if the patient is a primigravida. This fact is of importance, since among the conditions in which the child's head is found above the brim in a primigravida are a large head or small pelvis, both of them causes of a face presentation.

In addition, if the child's back is anterior, the groove between the occiput and the back may be detected, and if the face has entered the pelvis, then on dipping into the pelvis with the tips of the fingers it is found that the fingers on the side corresponding to the back cannot be pushed down so far as those opposite to it owing to

their coming into contact with the occiput. In the third and fourth positions this is not so easily determined.

The fœtal heart may give a clue, since in face presentation it is best heard through the chest of the child. In the third and fourth positions, therefore, it is heard particularly easily in about the same situations as it is heard in a first and second vertex presentation. In a first and second face, as the chest is turned towards the flanks, the heart sounds cannot be heard or only very indistinctly.

Vaginal Examination.—Before the membranes are ruptured, the presenting part will be higher up than usual, and the bag of membranes will tend to be large and sausage-shaped and will probably rupture prematurely, all owing to the fact that the face does not fill the lower segment as well as the vertex.

After the membranes are ruptured, the presenting part will feel very uneven, no sutures or fontanelles can be detected, neither can the hard, smooth surface of the vertex be felt. The practitioner, therefore, will soon come to the conclusion that the presentation is not a vertex, but he may be puzzled at first to decide whether or not it is a breech.

Of course, the previous abdominal examination should help in this respect, but it must be remembered that abdominal palpation, either from firmness of the abdominal muscles or adiposity, is not always an easy method of diagnosis, and it may be that nothing definite has been made out by it.

DIFFERENTIAL DIAGNOSIS.

Face.	*Breech.*
Orbital ridges.	——
Eyes.	——
Nose and nostrils.	——
Chin.	——
Malar bones.	Tuberosity of the ischium.
——	Genital organs.
Mouth.	Anus.
Alveolar ridges.	——
Tongue.	——
Finger perhaps sucked by mouth.	Finger gripped by sphincter.
——	Meconium on finger.

Any of these points may be of service, but it must be remembered that the findings depend upon the stage at which the examination is made.

Before Complete Extension.—For instance, if the examination is made before the extension is complete, only the forehead, orbital

ridges, and eyes and nose may be felt; as extension increases the mouth and chin will come into the field of examination.

After Complete Extension.—Then, again, by the time extension is complete, it most probably happens that the caput succedaneum on the face is becoming so marked that there is difficulty in distinguishing these landmarks, and it is then that there is a danger of mistaking the presentation for a breech. Then the mouth may be

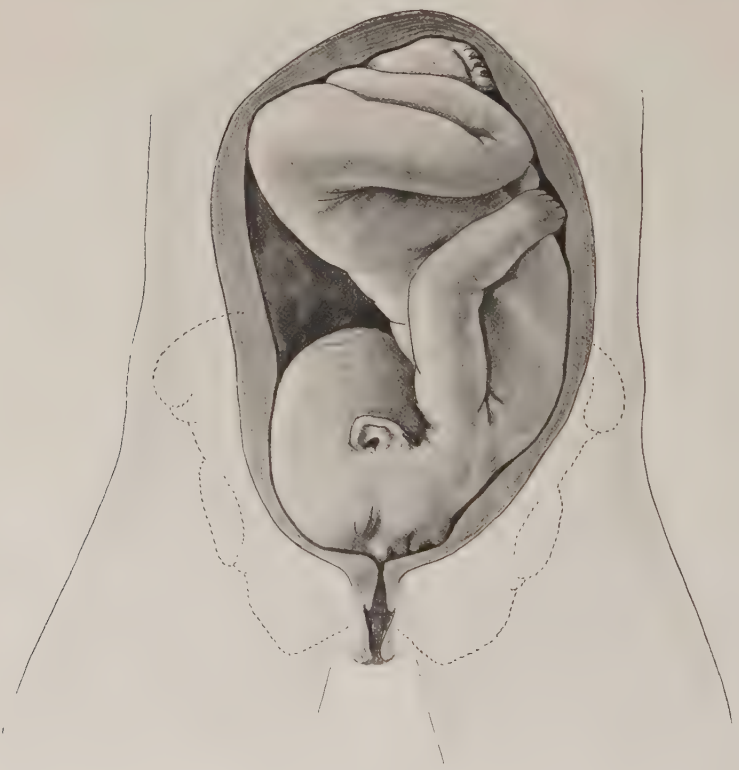


FIG. 76.—Face Presentation.

mistaken for the anus, the cheeks for the nates, the malar bones for the ischial tuberosities, and the nose for the coccyx.

Under these conditions, the practitioner will rely mostly on the fact that the mouth does not grip the finger, although it may suck it, that alveolar ridges can be felt, and that meconium does not come away.

If the presentation cannot be made out, an anæsthetic should be given and the patient more thoroughly examined (Fig. 76).

PROGNOSIS.

Mother.—The risk to the mother is certainly greater than in vertex presentations. It may be incurred as follows:

If labour is prolonged beyond the average time, the result, taking a large number of cases, will be less favourable to the mother. It has already been pointed out that premature rupture of the membranes is much commoner. The practitioner must remember that the *cause* of the face presentation may in itself prolong labour.

The diameter distending the vulval outlet when the face is born by flexion is either one measuring $4\frac{1}{2}$ inches (submento-vertical) if the chin escapes well under the pubic arch, as it should do before flexion, or $5\frac{1}{4}$ inches (mento-vertical) if it does not. In either case, therefore, a much larger diameter has to pass than is normal, with the result that the perineum is frequently lacerated. In unreduced mento-posterior positions the risk of laceration is still greater.

It is necessary in face presentation to make many more vaginal examinations than in vertex cases, in order that the attendant may see how labour is progressing; this in itself is an additional cause of risk.

Again, owing to the delay, or because of the cause of the face presentation, it may be necessary to use forceps or other artificial methods of delivery.

A reference to the list of causes will further show how the prognosis to the mother may be rendered more grave.

The above remarks refer to any position of face, whether the chin rotates forwards or not; but a worse prognosis is more especially indicated when, in the case of a first and second face, the chin rotates back into the hollow of the sacrum and becomes impacted.

The majority of face presentations are, however, born spontaneously, with a risk of perineal laceration to the mother.

Child.—It is, however, quite a different matter in the case of the child, the prognosis to which is much more severe.

The fœtal mortality of face presentation is about 12 to 14 per cent., a striking increase to that noted in vertex presentation, which is 2 to 3 per cent. This increased mortality is due to asphyxia from prolapse of the cord, from prolonged pressure due to early rupture of the membranes, from faulty mechanism in delivery (unreduced mento-posterior), or operative interference necessary to deliver the child.

The child's eyes or face may be injured by palpation or by the forceps, and the caput succedaneum may be so marked that the face will not assume a normal appearance for many hours.

The prognosis is gravest if the chin remains persistently posterior.

TREATMENT.

This will depend upon the stage of the labour at which the malpresentation is discovered, and is best discussed as follows :

Before Rupture of the Membranes.—If the pelvis is normal and the head does not appear to be unduly large, the best course is to leave the case alone and await full dilatation of the cervix. It is important to avoid premature rupture of the membranes if possible, so that the patient should be kept in bed. As in many cases the membranes rupture before full dilatation in spite of every care, preparations should be made to insert a de Ribes' bag as soon as this event occurs if the proceeding appears necessary.

If the pelvis is abnormal the action of the obstetrician will vary with its estimated size. With a flat pelvis having a true conjugate diameter of $3\frac{1}{4}$ inches or over, external podalic version may be performed, for there will be a better chance of extracting the child alive breech first than face first. An alternative is to attempt to convert the face into a vertex by Schatz's method. This, which is only applicable to mento-anterior positions, consists in pressing the chest of the child backwards and manœuvring its buttocks forwards so as to exchange the position of extension of the spine for one of flexion. This being accomplished, the occiput is pressed downwards to flex the head, the buttocks being brought still further forwards by the other hand. These manœuvres may be assisted by pressing the chin up through the membranes from the vagina, but there is much risk of prematurely rupturing them.

A third course is open to the attendant, namely, to do nothing until the membranes rupture, and then to insert the hand (dilating the os further with a de Ribes' bag beforehand if necessary), and either convert the face into a vertex or perform internal podalic version.

Of the proceedings described we think external podalic version should first be tried, and this failing, we recommend the last alternative.

If the pelvis has a true conjugate diameter of less than $3\frac{1}{4}$ inches, preparations for Cæsarean section should be proceeded with, the only other alternative being craniotomy.

After Rupture of the Membranes.—After the escape of the liquor amnii one of three events may happen :

1. The face may descend and the child be born spontaneously.
2. The face may be arrested at or above the brim.
3. The face may be arrested in the cavity of the pelvis.

Spontaneous Birth.—Given a normal-sized head and a normal pelvis, face presentations usually terminate spontaneously, for although a somewhat larger diameter than normal is thrown across the canal (cervico-vertical $4\frac{1}{2}$ inches instead of suboccipito-bregmatic or frontal $3\frac{3}{4}$ or 4 inches), yet if the chin rotates anteriorly the mechanism of the birth is favourable.

Because of the larger diameter engaged the second stage is usually slower and relative weakness of the uterine contraction commoner than in vertex presentation. So long, however, as the presenting part makes some advance with the pains there is no necessity for the obstetrician to interfere, if the condition of the mother and child be satisfactory. In mento-posterior positions rotation of the chin forwards is a necessity for spontaneous birth. If time be given this nearly always occurs unaided.

It is thus shown that in face presentation where the face descends into the pelvis the proper course is to await spontaneous birth as long as this appears probable (see below).

Face arrested at the Brim.—If the face is arrested at the brim the vast probability is that there exists some disparity between the head and the pelvis.

The course to be pursued depends upon the degree of this disparity. If the true conjugate be less than $3\frac{1}{4}$ inches, Cæsarean section, or, if it be contra-indicated, craniotomy is the proper treatment.

If that diameter be $3\frac{1}{4}$ inches or over, extraction of a living child through the vagina may be attempted either by internal version or by forceps after conversion of the face presentation into a vertex presentation, provided that the uterus is lax and the child vigorous.

The details of internal version are described on p. 613. If the os is not sufficiently large to introduce the hand, a de Ribes' bag should be first inserted. Manual dilatation may be performed or bipolar version attempted if a bag is not available.

Conversion is carried out by introducing the whole hand, and endeavouring by its means to flex the head, while the other hand assists externally to push down the occiput and flex the child's spine.

Version is, in our opinion, a more satisfactory proceeding than conversion, particularly if the cord be prolapsed.

If the uterus be rigid, craniotomy is as a rule the operation of choice, though occasionally Cæsarean section might be justifiable. If the child be dead or dying, craniotomy is the only course to be entertained.

Face arrested in the Cavity.—The commonest cause of arrest of

the face in the cavity is relative weakness of the pains. In such cases, if the chin be anterior, forceps should be applied.

A graver cause of arrest is failure of the chin to rotate forwards when the presentation is mento-posterior. As already stated, nearly all these cases spontaneously rectify if time be given them, so the obstetrician should be in no hurry to interfere except under three circumstances: First, when the mother's condition calls for delivery; second, when the child is obviously suffering; and third, when the chin has rotated directly backwards into the hollow of the sacrum, for, once the mento-frontal diameter is antero-posterior, spontaneous rectification can no longer be hoped for. Under such circumstances the chin must be rotated forwards by the hand in the same manner as the occiput in occipito-posterior presentation, see p. 323, and forceps then applied.

Supposing that the operator finds it impossible to turn the chin, two courses are open to him: First, to attempt delivery by forceps traction, and second, to perforate the head. While extraction of the child with the chin posterior could no doubt be effected in many cases by the exercise of great force, the inevitable and very serious laceration of the maternal soft parts that must ensue renders the proceeding of very doubtful justifiability. We ourselves are of opinion that craniotomy is the proper course to pursue in such circumstances.

BROW PRESENTATION.

Brow presentation is the uncommon condition where the mento-vertical diameter, measuring $5\frac{1}{4}$ inches, is endeavouring to engage, and in a normal-sized pelvis this is an impossibility.

CAUSE.

The causes of face presentation may be accounted also as those of brow, but the latter is peculiarly associated with one of them, namely, the flat pelvis.

DIAGNOSIS.

Abdominal Palpation.—As a rule, the presentation will not have been diagnosed until the cervix is well dilated. The condition is one between a vertex and a face. The signs which ought to be found on abdominal palpation, therefore, would be those corresponding to the latter condition, only as the occiput will not be so near the back, the groove between it and the back will not be so well marked.

Vaginal Examination.—The anterior fontanelle should be felt at

one end of the presenting part and the forehead as far as the supra-orbital ridges at the other end.

It must, however, be remembered that the caput succedaneum in these cases may be so large that the presentation cannot be accurately determined until the patient is anæsthetised and the hand is passed into the uterus.

PROGNOSIS.

With a pelvis and head of normal size, labour must become arrested in brow presentation, as it is impossible for the child to be born. A labour that has commenced as a brow may, however, terminate without any assistance if the child's head is small, or the brow becomes converted into a face or vertex (nearly always the former). Failing this, artificial delivery is imperative.

Mother. The maternal mortality depends upon how efficient the treatment may be. It is returned as from 5 to 10 per cent., death being due to exhaustion, rupture of the uterus, sepsis, etc. The maternal morbidity is also considerable, severe laceration of the perineum, vesico-vaginal or recto-vaginal fistulæ following the prolonged pressure of the head or the efforts of the practitioner to deliver.

Child.—The fœtal mortality is high, 25 per cent., and is due to the prolonged pressure or injury inflicted during delivery.

TREATMENT.

The treatment depends on the size of the pelvis, and whether the brow is movable above the brim or whether it is fixed in the brim.

True Conjugate above 3¼ inches. Brow above the Brim.

Version and Conversion.—If the membranes are intact the practitioner should not interfere before they rupture. When this event happens, internal version or conversion should be performed if the cervix is large enough; failing this, a bag should be inserted, or bipolar version carried out.

If a bag is used, either version or conversion must be employed when it comes out.

The technique of version is described on p. 613. Conversion is carried out by introducing the hand into the uterus and either extending the brow into a face or flexing it into a vertex.

If the uterus is rigid, neither version, conversion, nor the introduction of a bag should be attempted.

If version or conversion fail or are impossible, the practitioner has three alternatives: Cæsarean section, craniotomy, or pelviotomy.

Cæsarean Section.—We think Cæsarean section by far the best method of treatment, provided that the child is vigorous and the mother's condition good, and that there is a reasonable ground for believing that the uterus is not infected.

Craniotomy.—Unless the practitioner can command the necessary assistance for Cæsarean section, the best treatment is perforation, which must in any case be performed if there is sepsis, great exhaustion of the mother, or death of the child.

Pelviotomy.—Division of the pelvis has been advocated and carried out with success in these cases. We do not think it right to put the mother to so much risk with a problematical chance of delivering a living child.

Brow Fixed in the Brim.

If it is possible without undue force to push the head out of the brim, version may be performed or conversion attempted. If the forehead is in front, it might be possible to deliver with forceps. The soft parts at the outlet will, however, so surely be severely torn that we think perforation of a child whose chances of living are so remote is preferable to the certainty of severely injuring the mother.

If the forehead is behind, certainly no attempt should be made to deliver without perforating the child first.

True Conjugate under 3¼ inches.

The pelvis being too small for the delivery of a living child, Cæsarean section or craniotomy is the proper treatment.

PELVIC PRESENTATIONS.

CAUSE.

Pelvic presentations may be due to prematurity of the child, twins, hydramnios, hydrocephalus, contracted pelvis, placenta prævia, fibroid or ovarian tumours, tumours of the child, and apart from these, it is commoner in multigravidæ owing to the laxity of the abdominal and uterine walls favouring misplacement of the head. In fact, any condition which militates against the head entering the brim favours a pelvic presentation.

DIAGNOSIS.

Abdominal Examination.—On abdominal palpation, unless the patient is very fat or the muscles rigid, one can usually detect a pelvic presentation by finding at the fundus the head, which is larger,

harder, and more movable than the breech. The fœtal heart sounds will, if the back of the child is anterior, be heard on a level with the umbilicus and a little external to it, on the right or left side as the case may be.

Vaginal Examination.—The diagnosis on vaginal examination depends upon which variety of pelvic presentation one is dealing with.

Breech.—There are two varieties of breech, one where the thighs are flexed on the abdomen and the legs on the thighs, and the other where the thighs are flexed on the abdomen and the legs extended on the thighs.

Simple Breech. — At the commencement of labour, vaginal diagnosis of this condition will be difficult. Suspicion would be aroused if the presenting part was high up, soft, and almost out of reach, and if the bag of membranes was of the sausage-shaped variety. Later on, when the cervix is fairly well dilated, there are certain points indicative of a breech, which have already been dealt with under face presentation, p. 327.

Breech with Extended Legs.—We have had a case of this description where the diagnosis was made on abdominal palpation by feeling the legs by the side of the head. It is very rarely that a diagnosis may be made in this way. In most cases the condition is not suspected until the breech, having traversed the pelvic cavity some distance, becomes arrested low down (one variety of impacted breech). An examination then discloses the fact that the feet are not by the buttocks as is usually the case, and when the hand is pushed up into the uterus the legs are found to be extended on the flexed thighs.

Knee.—A knee can be diagnosed from an elbow as follows :

Knee.	*Elbow.*
Broader.	Narrower.
Patella.	No patella.
Two tuberosities with a depression between.	Two condyles with sharp olecranon between.
Points towards the head.	Points away from the head.

Since an elbow means a transverse presentation, it is most important that the practitioner should come to a correct diagnosis. If, therefore, he is in any doubt, he should feel along the limb for a foot or hand, and, if necessary, bring it through the vulva for inspection.

Foot.—A foot is most likely to be mistaken for a hand, and can be diagnosed from such as follows:

Foot.	*Hand.*
Long and narrow.	Short and broad.
At right angles to leg.	In the same line with arm.
Heel with malleolus above.	——
One edge thicker than the other.	Both edges same thickness.
Toes in a straight line.	Fingers different lengths.
Great toe in a line with others.	Thumb movable.
——	Hand may grasp finger.

If in doubt, bring down the part and inspect it.

PROGNOSIS.

Mother.—Pelvic presentations take longer to be delivered, and are not quite so favourable to the mother as vertex, the difference in the mortality and morbidity being due to the fact that artificial interference is more often necessary, so that bad perineal tears, for instance, are fairly common.

Apart from the mortality, there is a greater degree of morbidity than in vertex cases.

Child.—The gravity of pelvic presentation chiefly concerns the fate of the child. The fœtal mortality in pelvic presentation is marked, in primigravidæ somewhere about 10 per cent. with assistance of average efficiency. It is quite possible, however, if the greatest care is not taken in treating these cases properly, for the percentage to be much higher.

The child often dies of asphyxia, blue or white, and more rarely of some serious injury to the abdominal or thoracic organs.

The asphyxia may be brought about in various ways. Early rupture of the membranes conduces to prolonged pressure on the child, the placenta being compressed between the hard head of the child and the fundus. It also prevents the cervix being fully dilated, and as the breech is able to slip through a smaller opening than the head, the latter may be delayed and the cord pressed upon.

The cord is further pressed upon by the head as it traverses the vagina, and if the patient delays making the voluntary effort necessary for its expulsion, the child is very likely to die. Prolapse of the cord may endanger the life of the child.

When the birth of the upper half of the child is delayed, or the body is born and not protected, premature respiration is likely to occur; liquor amnii is thus inhaled, which seriously handicaps the chance of reviving the child.

Finally, the placenta may be separated or partially separated before the child is born, owing to the retraction of the empty uterus, which has expelled the head into the vagina.

The arms or legs may be fractured when they are extended and an attempt is being made to bring them down. The lower jaw may be dislocated or fractured and the floor of the mouth injured in an attempt to cause flexion if the head is extended. The clavicles may be fractured or the sterno-mastoid muscles injured during the Prague method of delivery. The femur may be fractured, the skin of the thighs or the muscles thereof torn or the femoral vessels or the genitals injured when attempting to deliver an impacted breech by digital or instrumental traction.

TREATMENT.

Before Labour.

A pelvic presentation having been diagnosed before labour, an endeavour should be made to ascertain the cause, since the treatment to be adopted may depend a good deal on this. In the interests of the child external cephalic version should always be performed if a pelvic presentation is discovered before labour, or even at the commencement of labour, supposing the breech is not fixed in the brim, and this more especially in a primigravida, where the passages have not before been dilated and interference is more often necessary. The presence of a contracted pelvis as a cause may also indicate the necessity for cephalic version. After the version is complete a binder should be applied to keep the child in position, see p. 602.

During Labour.

The treatment of an ordinary case of breech labour, that is when there is nothing abnormal except the presentation, can be summed up as follows :

1. As it is most important that the membranes should be intact as long as possible, the patient should be directed to rest throughout the first stage and not to bear down.

2. Make a vaginal examination on rupture of the membranes to ascertain any malposition of the cord.

3. When the breech is born

(*a*) Pass the finger into the vagina and pull down a loop of cord and place it on one side of the pelvis where the pressure is likely to be least, so that the pulsations can be watched during the remainder of the delivery—an important matter, since the cord is in danger from pressure directly the breech is born.

(*b*) Wrap a warm cloth round the body as it is born, so as to prevent, if possible, premature inspiration whilst the head is still unborn.

4. Hold the breech in the right hand and guide it forwards towards the mother's abdomen, at the same time telling her to bear down, and pushing the head downwards and backwards with the left hand on the abdomen, by which means extension of the head is prevented and its delivery facilitated.

The above is the routine method of treatment, but it may be

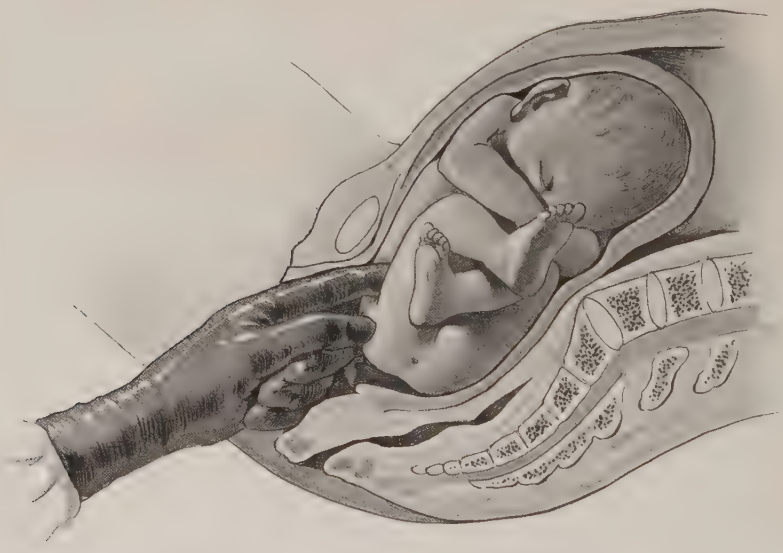


Fig. 77.—Digital Traction on the anterior Groin.

necessary to interfere because the birth of the child is arrested in some part of its course, or because it is necessary to hasten delivery.

Delay in the Birth of the Breech.—The birth of the breech may be delayed above the brim or in the pelvic cavity.

Delay above the Brim.—If the breech is delayed above the brim, the cause is generally a contracted pelvis, and the treatment of such a condition will depend entirely on the amount of disproportion between the child and its mother. Cæsarean section may be warranted or it may not. If Cæsarean section is contra-indicated, it will be best to bring down a leg, after which traction may be exerted according to the necessity of the case.

More rarely delay above the brim is due to a tumour of the uterus or ovary, which must be treated accordingly, or some tumour of the

child, the treatment of which will be discussed under Impacted Breech.

To Bring Down a Leg.—The patient is on her left side, and the operator passes his left hand into the uterus in the dorso-anterior position, and his right hand, in the dorso-posterior position, as far as the feet of the child. He then takes hold of the anterior foot with his index finger on one side of the leg and his middle finger on the other and gently draws the leg down.

If, after the leg is outside the vulva, there is any necessity to

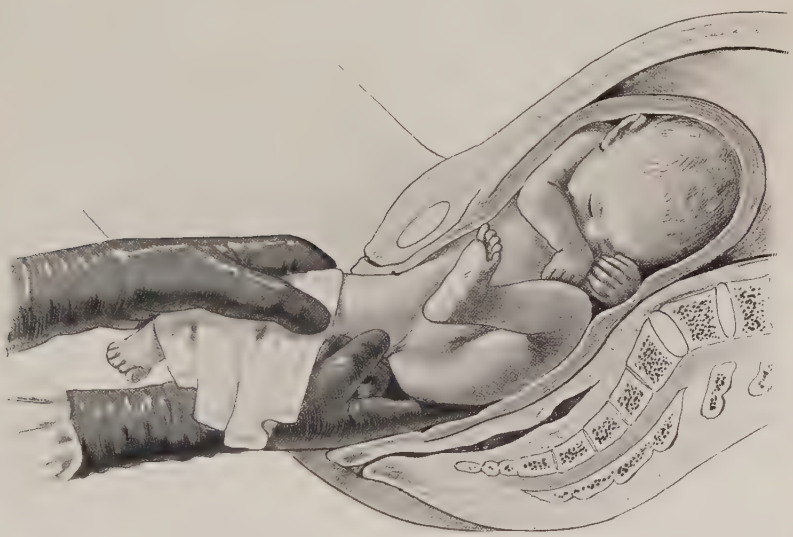


Fig. 78.—Digital Traction on the posterior Groin.

hasten delivery, then the leg must be pulled upon in the manner described on p. 340.

Delay in the Pelvic Cavity.—Delay may be due to: Deficient expulsive powers of the mother; rigidity of the maternal soft parts; extension of the legs; disproportion between the child and pelvis; or tumours of the child.

Inertia or Rigidity.—In these the treatment is as follows:

Digital Traction.—If the breech is very low down, it can, under the circumstances detailed, be generally and easily delivered by digital traction. This is carried out by passing the index finger of the right hand over the anterior groin and pulling (Fig. 77). After the anterior buttock has advanced, the index finger of the left hand can be passed over the posterior groin, and this buttock pulled down

Fig. 78), whilst occasionally it will be found possible to pull on both groins at once. Failing this, it will be easy to bring down one leg by passing the fingers just inside the vagina and taking hold of a foot.

When the legs have been brought down traction on the thigh aided by supra-pubic pressure is permissible until the umbilicus is born, after which no further traction on the breech should be made or the arms will become extended (Fig. 79).

Extension of the Legs.—The legs may be extended by the side of the body or in front of the body. In the first case the birth of

Fig. 79.—Artificial Delivery of a Breech Presentation. Thigh Traction and Supra-pubic Pressure.

the child is hindered by the extended legs preventing lateral flexion and the breech is arrested comparatively early.

More rarely the legs are extended somewhat in front of the body; in this case lateral flexion might be hindered, but the impaction is due to the diameter formed by the feet and head being too large to enter the pelvis. In this variety, the impaction takes place when the breech is far advanced.

Extension of the legs is best treated by bringing down both legs. This will allow lateral flexion to take place, and will also break up the wedge.

Method of Bringing down an Extended Leg.—This at times is a

difficult operation, especially if there is not much room and the uterus is somewhat firmly contracted round the child.

The patient should be fully anæsthetised, and then, having placed her on her left side, the operator passes his right or left hand,

Fig. 80. Passing the Fingers up to the Knee.

according to the position of the child, into the uterus. He can now choose one of two methods: Either he may pass his hand up along the extended leg till the foot is reached, and then, holding it between the index and middle fingers, sweep it across the face and pull it down, or he may pass his hand only as far as the knee, abduct it,

and rotate the thigh outwards (Fig. 80), when the leg flexing of its own accord, the foot will come within reach of the hand (Fig. 81) and can then be brought outside the vulva (Fig. 82).

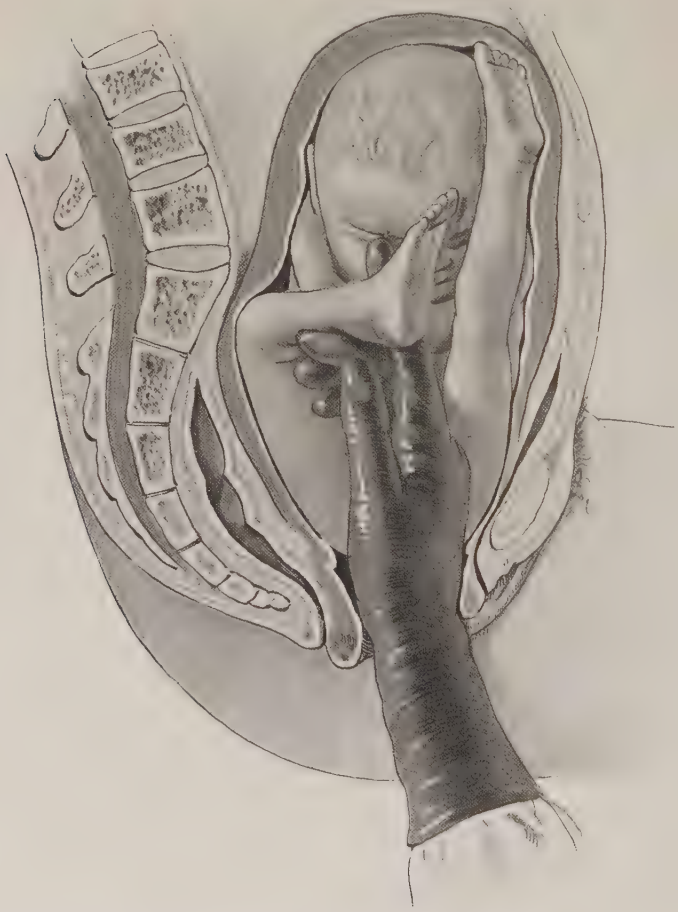


Fig. 81.—Seizing a Foot after Abduction of the Knee and external Rotation of the Thigh.

This will usually be sufficient, for traction on the leg that has been brought down by causing extension of the spine, brings down the foot of the still extended leg below the level of the head (Fig. 83), and further traction rotates the buttock forward (Fig. 84).

Fundal pressure should always be applied at the same time.

This manœuvre very seldom fails. If it does, then delivery may be attempted by Cæsarean section with a soft fillet or blunt hook.

Cæsarean Section.—Under favourable circumstances, when it is known that the child is alive, delivery by Cæsarean section can be

FIG. 82.—Extended Legs. Bringing down the Foot.

carried out. In the absence of either or both of these conditions delivery by the vagina must be persisted in.

Soft Fillet.—The soft fillet, which can be fashioned out of a handkerchief or bandage, is at times difficult to pass, and even when passed it is not as effective as a blunt hook. As, however, it does

not tend to injure the child as much as the latter instrument, it is worth trying if the child is alive.

The fillet may be passed over the anterior thigh so that it rests in

FIG. 83.—Extended Legs. Traction on the Leg brought down.

the groin, over the posterior thigh, or over both. The fillet is not an absolutely safe method of delivery, for, if very great force is employed, the thigh may be fractured or dislocated.

The Blunt Hook.—If the child is dead, no hesitation need be felt

in passing the blunt hook over the thigh at its junction with the body. To do this, the operator passes his left hand along the anterior buttock till he comes to the flexure of the thigh, and with his right hand he passes the hook along the left hand until the point of the hook is well above the point of junction of the body and thigh. The hook is then rotated so that its point turns towards the genital organs of the child. The fingers of the left hand are then transferred to the groove between the buttocks and the point of the hook, which is identified and steered clear of the inner border of the thigh. Keeping his fingers on the point of the hook to prevent it hurting the genitals or the thigh, the operator adjusts the hook with his right hand so that it engages with the thigh in the region of the groin (Fig. 85). By now applying traction, great force may be exerted. There are several dangers connected with the use of the blunt hook, some due to the carelessness of the operator and some inherent to the instrument itself.

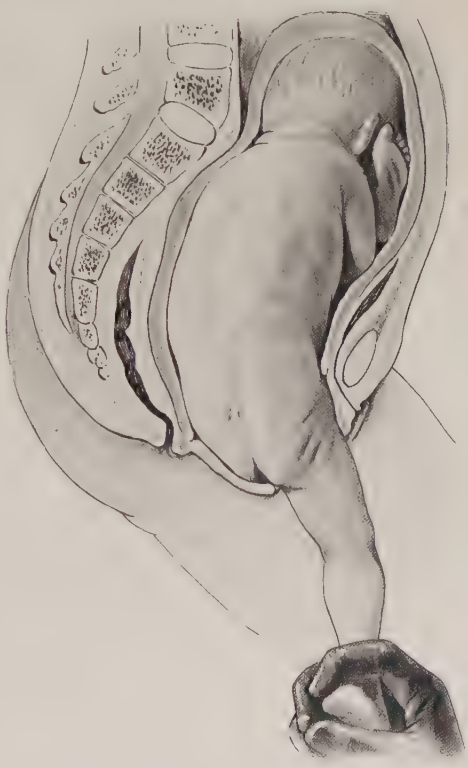


Fig. 84.—Rotation of the Buttock forward.

For instance, if the operator does not adjust the hook properly, its point may injure the skin, muscles or vessels of the thigh or the genitals. If the operator uses an instrument with the hook less than 2 inches in diameter, its point will probably catch, despite all adjustment, and if he does not put a piece of indiarubber tubing over the hook, the hard steel will be likely to damage the skin.

Even, however, if all these precautions are taken, fracture or dislocation of the hip is not at all unlikely unless the greatest care be exercised. We think it is always well, therefore, to try a soft fillet

first if the child is alive, in spite of the fact that it is not a particularly satisfactory means of delivery.

Amputation of the Leg.—If delivery with the blunt hook fails, a

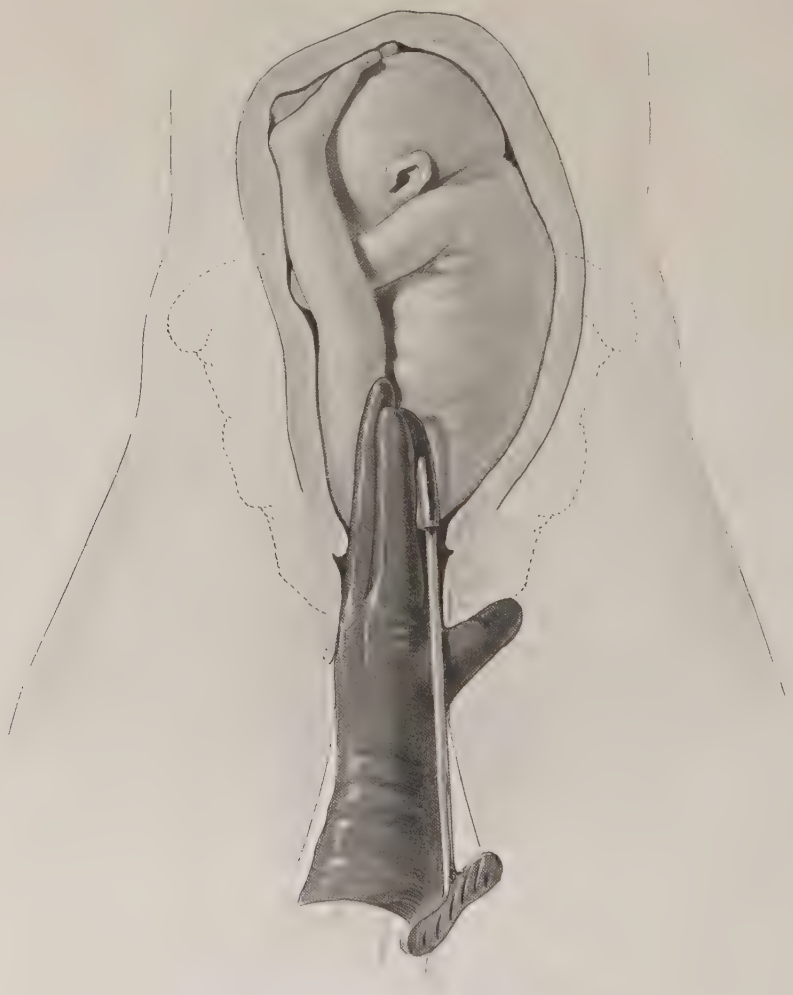


Fig. 85.—Extended Legs. Passing the Blunt Hook.

decapitating hook may be passed over the groin, the leg amputated and separately extracted with volsellum forceps (Fig. 86). After this the second leg should be brought down and the trunk delivered by traction and the head subsequently perforated.

Disproportion between the Child and Pelvis.—If the pelvis

is contracted, the child of unusual size but otherwise healthy, or the size of the child is increased because of some abdominal or thoracic tumour, the greatest difficulty may be experienced in delivering by the vagina.

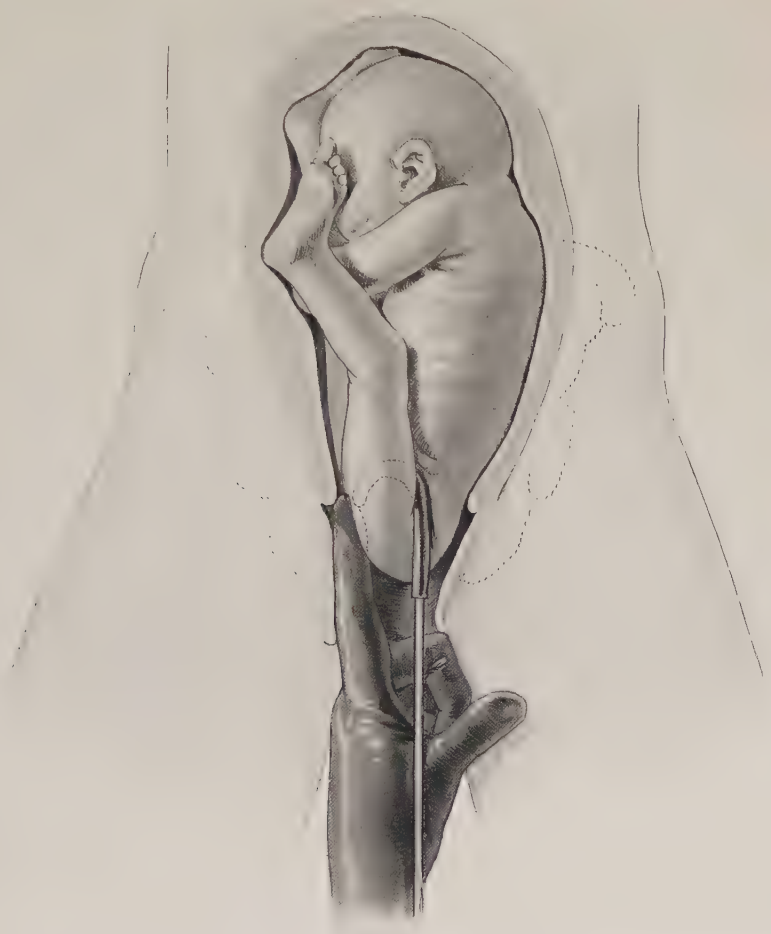


Fig. 86.—Delay in the Pelvic Cavity due to Extended Legs. Amputation of the Leg.

Cæsarean Section.—If the disproportion is obviously very great the question of Cæsarean section must be considered.

Bring Down a Leg.—If Cæsarean section is deemed inadvisable, the operator must endeavour to deliver the patient by bringing down a leg.

He may, however, fail in this, either because there is not sufficient

room to get his hand up between the breech and the pelvis, or because the uterus has contracted so tightly round the child.

Even if he can bring down a leg he may be unable to shift the impaction.

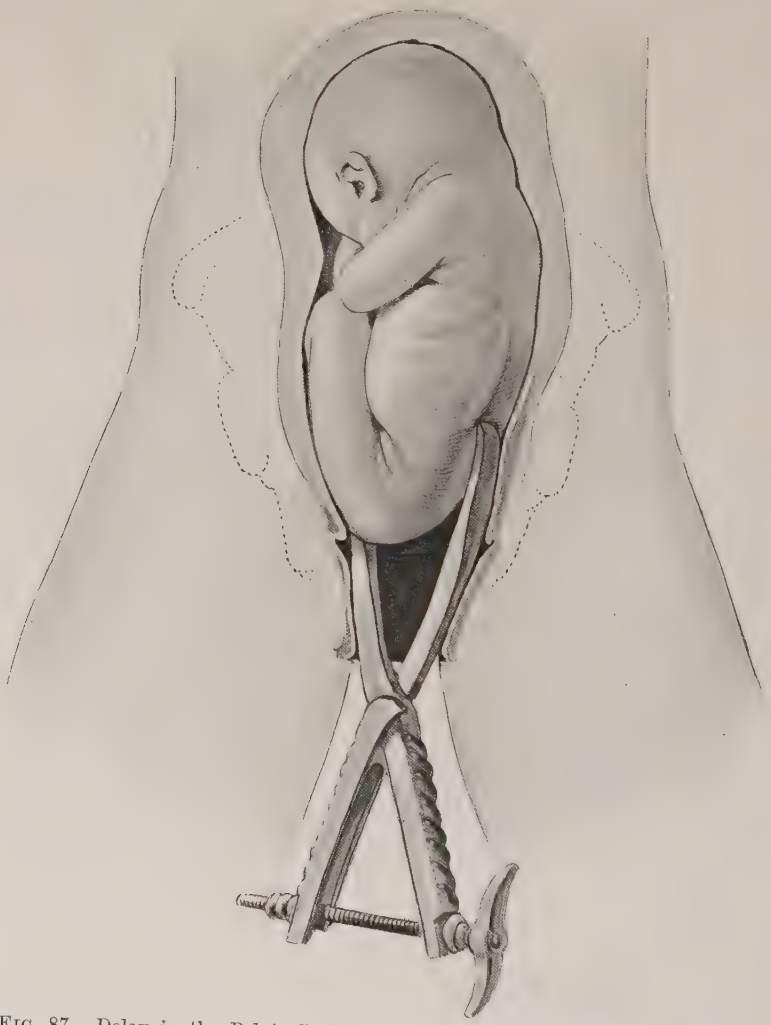


FIG. 87.—Delay in the Pelvic Cavity due to disproportion between Child and Pelvis. Application of Cephalotribe.

Bring Down Both Legs.—He should then bring down the second leg and make traction with both, which will deliver the buttocks unless the pelvic contraction is very marked.

Cæsarean Section or Blunt Hook.—If by reason of impaction it is

impossible to bring down the legs, then the immediate alternatives are Cæsarean section or delivery by the blunt hook.

Amputation of the Leg.—If the blunt hook fails, the leg should be amputated as previously described.

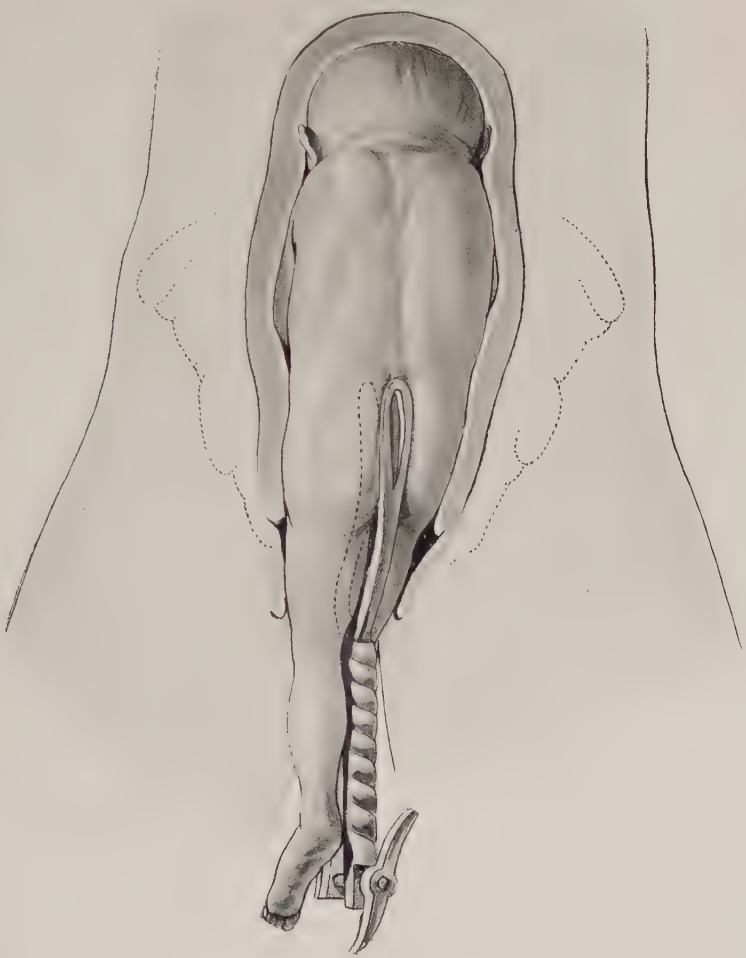


FIG. 88.—Delay in the Pelvic Cavity due to disproportion between the Child and Pelvis. Pulling on the Pelvis with the Cranioclast.

Crushing the Child's Pelvis.—If all these methods fail, the operator applies one blade of the cephalotribe over the sacrum and one over the pubes, and, having crushed the pelvis, delivers the child, assisting the cephalotribe with traction on the legs (Fig. 87).

Additional Methods of Traction.—Instead of crushing the pelvis, the cranioclast may be used by passing the solid blade up the rectum and the fenestrated one over the sacrum (Fig. 88), or traction on the legs may be assisted with the crotchet fixed over the pubes (Fig. 89).

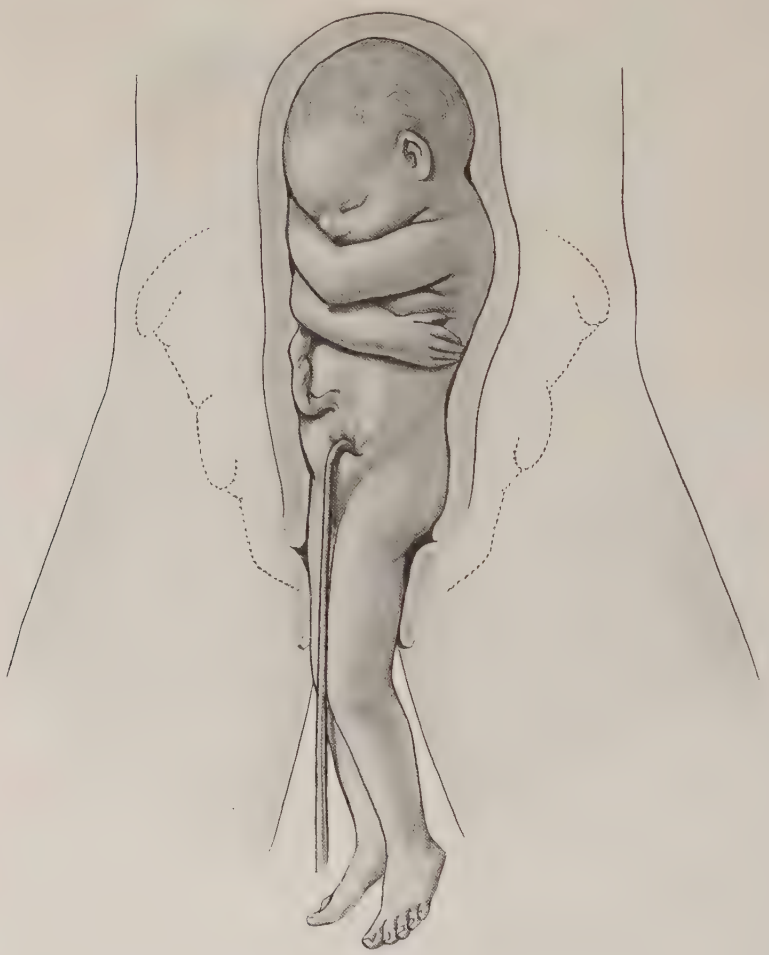


Fig. 89.—Delay in the Pelvic Cavity due to disproportion between the Child and Pelvis. Pulling on the Pelvis by means of the Crotchet.

Tumours of the Child.—Tumours of the child preventing delivery may be cystic or solid.

Cystic Tumours.—The following cystic tumours may be met with: Hydrothorax or ascites; distended bladder; ureters or kidneys; spina bifida.

If the swelling is due to a collection of fluid in the abdomen or chest or to a spina bifida, this can be evacuated with the perforator or a pair of scissors. If it is due to distension of the urinary organs, these will have to be incised after the abdomen is open.

Solid Tumours.—The impaction of the breech may be due to a solid tumour of the liver, kidney, or spleen, in which case it must be broken up and removed piecemeal, or it may be due to a

Fig. 90.—Artificial Delivery of a Breech Presentation. Bringing down the posterior Arm.

sacro-coccygeal tumour, when a similar treatment must be carried out.

As the child may be born alive in those cases where the pelvis has been crushed or fluid evacuated, the operator should perforate its head before delivery. The fœtal hæmorrhage accompanying the removal of solid tumours will be sufficient to destroy the child, so that there is no need to perforate the head for this reason alone.

Delay in the Birth of the Arms. The delay in the birth of the child may be due to some abnormal position of the arms preventing its further advance. As a rule the arms are folded on the chest, and if it is necessary to hasten delivery the operator can draw the legs of the child forward and passing his right hand up to the arms bring them down (Fig. 90), but when causing delay the

arms may be extended by the side of the head, or the upper arm may be extended and the forearm flexed behind the head.

Extension of the arms is diagnosed by arrest of the birth, failure to feel the arms folded on the chest, or by the fact that the inferior angles of the scapulæ are rotated away from and are not lying adjacent to the fœtal spine.

Lateral Extension of the Arms and Forearms.—This is the commonest variety of displacement, and is due nearly always to

Fig. 91.—Artificial Delivery of a Breech Presentation. Bringing down extended Arm.

traction on the child, though it may be due to the increased friction present when the pelvis is small or the child large. The diameter of the arms plus that of the head is too great to pass through the pelvis. Of the different methods of releasing the arms, the best is to deliver the posterior arm first by drawing the legs of the child as far forwards as possible with the right hand, and then passing as much of the left hand as is necessary into the vagina up the back of the child to the shoulder, and then along the arm to the elbow. With the index and middle fingers acting as splints on each side of

it, the forearm is drawn across the face and then out of the vagina (Fig. 91).

The body of the child is next rotated, so that the anterior arm becomes posterior and the remaining arm is brought down in a way similar to that of the first. An alternative method is to draw the legs of the child as far back as possible and release the anterior arm with the right hand, but this manœuvre will only be successful with a partially extended anterior arm, rather low down.

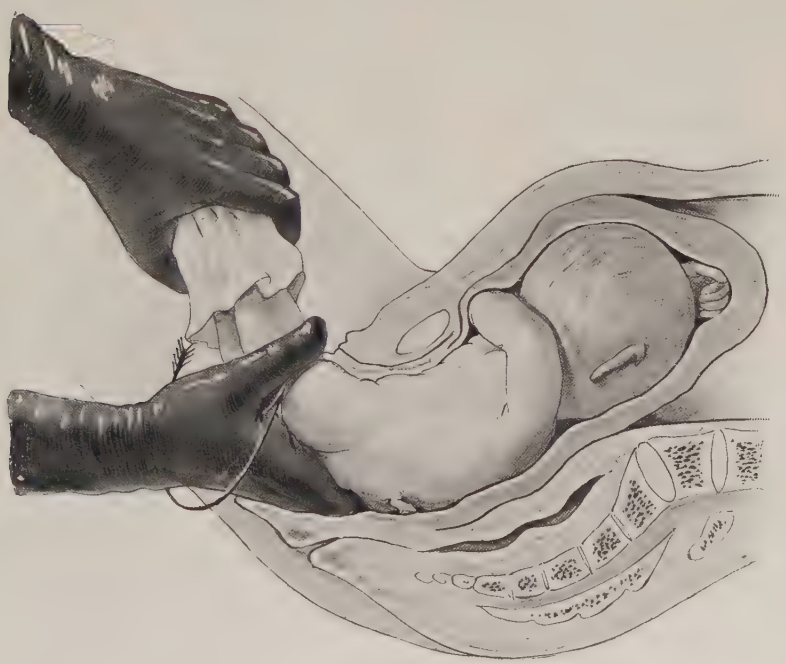


Fig. 92.—Breech Presentation. Overcoming Obstruction due to Dorsal Displacement of the Forearm.

Lateral Extension of the Arm with Dorsal Flexion of Forearm. (Dorsal Displacement).—Rarely during the birth of the child, one of its forearms becomes displaced behind the occiput. In this case the body should be rotated in the direction of the hand belonging to the displaced arm, by which means the arm will be freed (Fig. 92).

Rarely, owing to the small amount of room available, it may be impossible to bring down the arms in the manner indicated, in which case the index finger or a small blunt hook, preferably the former if the child is alive, may be passed over the humerus and traction exerted. The humerus will probably be broken, and the

child will probably be dead. Failing delivery of the arms by this method, a very rare occurrence, the head must be perforated.

Delay in the Birth of the Head.

This may be due to: Deficient expulsive maternal force; extension of the head; insufficient dilatation of the cervix; or occipito-posterior position of the head.

Fig. 93.—Artificial Delivery of a Breech Presentation. Prague Method of Delivering the extended Head.

The child cannot live for more than six to nine minutes after the body is born, so that the practitioner has to carry out the various methods of delivering the head with promptitude and order.

Deficient Expulsive Maternal Force.—Delay in the birth of the head due to deficient expulsive power is common. It is due to the fact that when the head has left the contracting uterus it passes into the vagina; consequently, unless the head is small,

it is not likely to be born spontaneously unless the mother makes a vigorous voluntary expulsive effort. If the head is delayed for want of this, there are three methods of applying traction to it:

Thigh Traction and Supra-pubic Pressure.—This is a simple and quick method of releasing the head. The left hand makes strong pressure on the head from the abdomen, whilst the right hand carries the body of the child forwards between the mother's thighs.

Prague Method of Delivery.—The patient being on her left side, the right hand grasps the legs of the child, already wrapped in a cloth, and carries them over the mother's abdomen between her legs, the index and middle fingers of the left hand being meanwhile

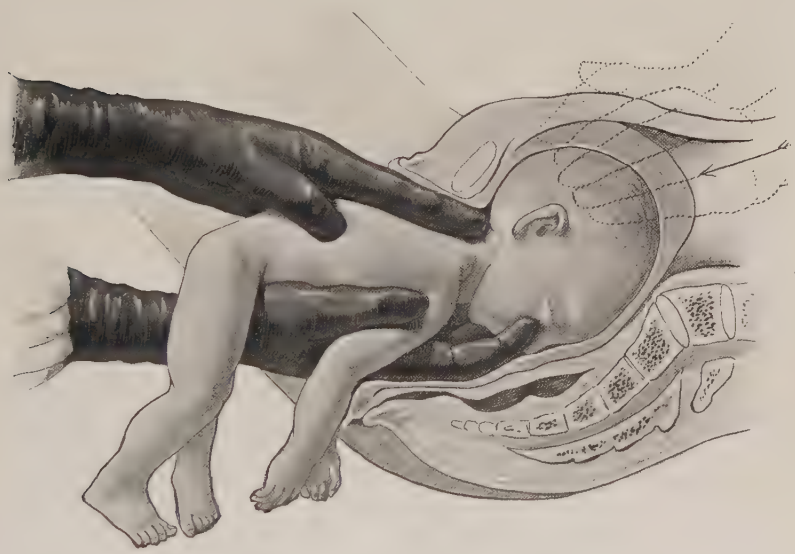


Fig. 94.—Artificial Delivery of a Breech Presentation. Face and Shoulder Traction.

placed one on each side of the child's neck, which support the child on its expulsion and prevent its being injured. If possible an assistant should meanwhile press on the fundus of the uterus. A good deal of force can be applied in this way, and the counter-pressure of the back of the pubes against the child's occiput tends to cause flexion (Fig. 93).

Face and Shoulder Traction.—This method, which is perhaps the most effectual, is carried out as follows: With the patient on her left side, the body of the child is made to ride on the left arm, the index and middle fingers of the left hand at the same time being placed on the child's malar eminences. The index and middle fingers of the right hand are then placed one on each side of the

neck, and traction is made, augmented by fundal pressure carried out by an assistant, while the fingers against the face keep the head flexed (Fig. 94). This is a modification of "jaw and shoulder" traction, wherein the index finger of the left hand is inserted in the mouth. This classical method has the disadvantage of being liable to injure the jaw.

Extension of the Head.—Extension of the after-coming head is most usually due to injudicious traction on the breech, for if traction is made on the breech, force is applied to the head through the fœtal spine, which is attached nearer the occiput than the forehead. As a result the occiput is pulled down and the head becomes extended. Consequently a diameter of 5 inches (occipito-mental) is thrown across the pelvis instead of 4 inches (suboccipito-frontal). Extension may also at times be due to the large size of the child's head or the small size of the mother's pelvis.

The head may be delayed above the pelvic brim or in the pelvic cavity.

Head delayed above the Pelvic Brim.—Delay above the pelvic brim, due to extension and very likely disproportion between the mother and child, should be treated by fundal pressure, combined with gentle traction on the feet in various directions to see if the head can be pulled through the brim.

If after a few trials this method is unsuccessful, face and foot traction may be tried, the practitioner pulling on the feet with his right hand, and at the same time pulling and flexing the head of the child with the index and middle fingers of his left hand on the child's malar bones.

If this does not succeed, face and shoulder traction should be tried as just described.

Failing delivery by these methods, the head must be perforated just behind the ear or through the floor of the mouth.

Head delayed in the Pelvic Cavity.—In this case an attempt should be made to deliver by face and shoulder traction or the Prague method.

Forceps.—If these methods are not quickly successful, an attempt should be made to deliver the head with forceps. For the application of forceps to the after-coming head see p. 599.

Perforation.—Forceps failing, nothing remains but perforation.

Insufficient Dilatation of the Cervix.—In pelvic presentation the cervix may cause difficulty under two essentially different conditions, one fairly common and the other rare.

Common Cause.—If the membranes rupture early, the breech has to dilate the cervix. When the cervix is large enough for the

breech to slip through it need not further dilate till the head comes into it. By the time the head is passing through the cervix, the body is born. Now the breech is smaller than the head, consequently the external os, which was large enough for the breech to pass, is too small for the head, therefore the head is delayed.

As a rule, gentle traction by the methods already mentioned combined with fundal pressure is sufficient to effect the small extra dilatation necessary.

Rare Cause.—Rarely it is necessary to deliver the child quickly,

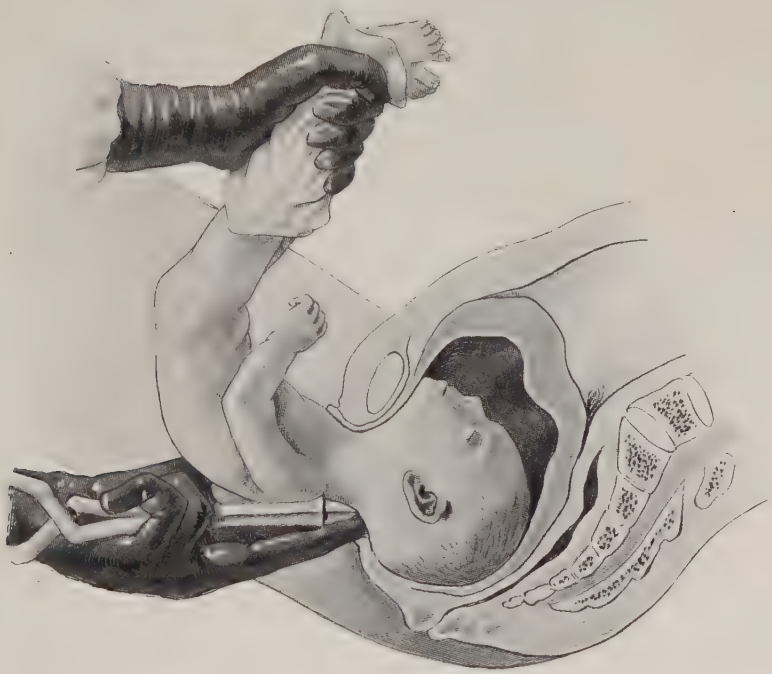


FIG. 95.—Breech Presentation. Perforating the after-coming extended Head.

in which case as soon as the hand can be passed into the cervix this is done and the half breech is brought down. The size of the cervix is then a much more serious matter, since it is not nearly dilated to its full extent, and will probably contract round the neck and cause great difficulty in delivery.

If the fingers can be inserted between the head and the cervix, it may be possible to lever it over the head. If this fails, the head should be perforated, since the alternative of incising the cervix is not justifiable unless there is a very great chance of delivering a child that will live, which in nearly every case there is not; for, as a

rule, the arms will probably become extended, and by the time these have been released the child will be asphyxiated. It must be remembered that the rapid delivery in this class of case is purely for the sake of the mother.

It need hardly be said that if the child is dead and there is the slightest difficulty in delivering the head, it should be perforated forthwith.

Occipito-Posterior Position.—*Rotation.*—If the occiput is posterior, an effort should be made to turn it forwards by traction with the finger in the mouth, at the same time rotating the body of the child in the same direction with the other hand. This will nearly always be successful.

Perforation.—In the cases where rotation fails, the head is probably impacted and perforation will be necessary (Fig. 95). Before resorting to this operation, however, and if the child is alive, a final attempt may be made with the patient on her back, the legs and body of the child being drawn over the mother's abdomen with one hand, and the shoulders of the child drawn upon by the index and middle fingers of the other hand; in fact, delivering it by a reversed Prague method.

ABNORMAL POSITION OF THE UPPER EXTREMITY IN HEAD PRESENTATION.

In some cases of head presentation an arm is found to be extended by the side of the head (prolapse), or the forearm flexed behind the head (dorsal displacement).

Lateral Extension of the Arm (Prolapse of the Arm).

CAUSES.

If the head is prevented from filling the brim properly it is possible for the arm to slip down by the side of it. Such conditions, therefore, as face or brow presentation, hydramnios, contracted pelvis, anterior or lateral obliquity of the uterus or some abdominal tumour will favour the descent of the limb.

Again, if the child is dead or premature, the arm may prolapse, because the limbs no longer remain flexed on the chest or because the head is so small.

SIGNS.

The amount of prolapse varies; sometimes before rupture of the membranes the hand can be felt by the side of the head (Fig. 96). On rupture of the membranes the arm may descend.

DIAGNOSIS.

It is very important that the hand should be diagnosed from the foot. The appearance of the latter by the side of the head necessitates an entirely different treatment. For this diagnosis see p. 336.

FIG. 96.—Presentation of the Head and Hand.

TREATMENT.

The treatment will depend on the cause. Thus tumours must be dealt with on the lines indicated in Chapter XIV.

If the head is above the brim and the pelvis is of the flattened variety, with a conjugate diameter of sufficient size to allow the head to pass, version is the best treatment.

Where a sufficient cause cannot be detected or the displacement is due to hydramnios, death or prematurity, the complication should be treated as follows:

Before the Membranes are Ruptured.—Push the limb up past the

head with one hand and then press the head well down into the cavity from outside with the other.

After Rupture of the Membranes.—Try and push the hand up again. If this fails, allow labour to progress; the limb and head may be born together, or the limb may remain behind and the head advance. If, however, labour is arrested, forceps should be applied

Fig. 97.—Dorsal Displacement of the Arm.

to the head, care being taken not to include the arm between the blades of the instrument.

If the impaction is too great to allow of delivery this way, the head must be perforated.

Posterior Flexion of the Forearm (Dorsal Displacement).

This is a very rare complication, in which with the arm extended the forearm gets displaced transversely behind the child and below

the occiput, and catching against the brim of the pelvis or some part of its cavity, prevents further advance of the head (Fig. 97).

DIAGNOSIS.

This complication is always discovered accidentally when a failure to deliver with forceps leads to a more thorough examination.

TREATMENT.

We have never met with this complication. Those who have

FIG. 98.—Presentation of the Foot and Head.

advise an attempt being made to rectify the position of the arm or the performance of version according to what they found successful in their own particular case.

ABNORMAL POSITION OF THE LOWER EXTREMITY WITH HEAD PRESENTATION.

Prolapse of the Foot.

At times the foot may be found presenting by the side of the head. This means that the leg is extended (Fig. 98).

CAUSE.

For the foot to present by the side of the head, apart from operative interference, the child must be dead or premature, in

Fig. 99.—Presentation of the Hand and Foot.

which case the other causes mentioned under prolapse of the arm may predispose to such a complication.

DIAGNOSIS.

Care must be taken not to mistake the foot for the hand, see p. 336.

TREATMENT.

Before Rupture of the Membranes.—With one hand try to push the foot up, and with the other fix the head in the pelvis by suprapubic pressure.

After Rupture of the Membranes.—Again try and replace the foot. If this fails, the foot should be pulled upon and the half breech made to engage. When the foot and head are impacted, it has been found necessary to apply a noose to the foot, by which means additional force can be obtained, for whilst traction is exerted by the noose with one hand, the other hand can be passed into the vagina and the head pushed up. If this fails the head must be perforated. Our own experience coincides with that of many others who have met with this complication. We could push up the foot.

PRESENTATION OF THE HANDS AND FEET.

CAUSE.

This complication is due to a leg and arm becoming prolapsed in an oblique presentation (Fig. 99).

TREATMENT.

This complication may be successfully overcome by the performance of either external cephalic or podalic version before the membranes are ruptured, or by traction on the leg after the membranes were ruptured.

OBLIQUE POSITION.

Shoulder, Arm, Back, or Abdomen Presentation.

CAUSE.

Oblique positions are so frequently associated with multigravidæ (nearly 90 per cent.) and so rarely with primigravidæ that there must be some condition the result of pregnancy and childbirth apart from any other cause that favours the oblique position. This is undoubtedly the stretched abdominal walls, which after the first pregnancy fail to play their part so well in maintaining the uterus and child in the vertical position, with the result that the head is not kept so constantly over the pelvis as with a first child, neither does the head engage in the pelvis towards the end of pregnancy like it does in a primigravida.

For similar reasons, anterior and lateral obliquity of the uterus is much commoner in multigravidæ.

Another cause of oblique position is a contracted pelvis, and this knowledge, especially in the case of a primigravida, will lead the practitioner to make a careful examination of the pelvis.

Other causes are premature or dead children, hydramnios, twins, placenta prævia, and tumours of the uterus or ovaries. It is obvious how any of these conditions may cause an oblique position.

DIAGNOSIS.

Abdominal Examination.—The information obtained from abdominal examination depends entirely on the state of the membranes and how long they have been ruptured. If the patient

FIG. 100.—Oblique Position. Appearance on Abdominal Inspection.

is fat the examination may be difficult. In favourable cases, before and soon after rupture of the membranes, the position of the child can be detected by abdominal examination.

Before Rupture of the Membranes.—On Inspection.—The shape of the abdomen is found to be altered, so that it appears

abnormally broad from side to side and the uterus is seen to be lying very obliquely (Fig. 100).

On Palpation.—The hard head is felt in one iliac fossa, and the soft breech is felt on the opposite side at a higher level, whereas no part of the fœtus can be identified when the upper and lower portions of the uterus are palpated in the usual way.

The limbs, or the smooth surface of the back, may be felt in front according to the position of the child.

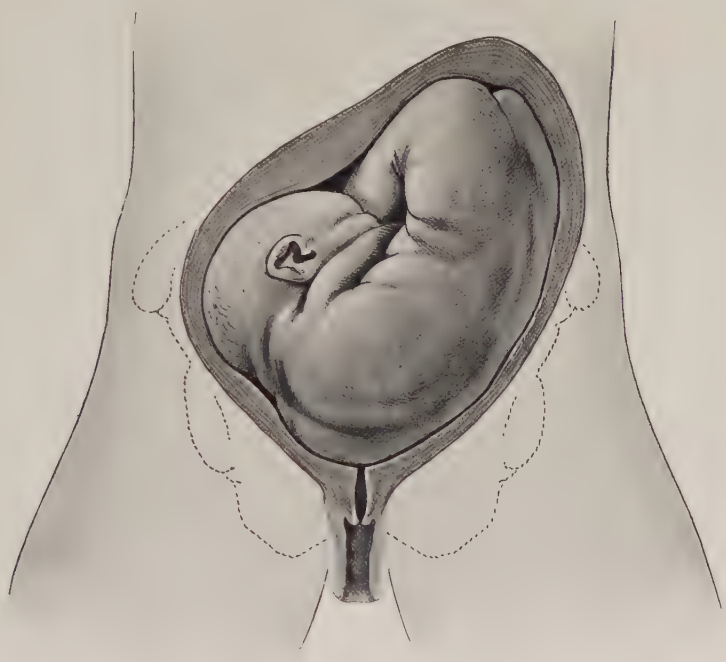


Fig. 101.—Oblique Position. Shoulder Presentation.

On Ascultation.—If the back of the child is to the front, the fœtal heart sounds may be heard at a lower level in the abdomen than usual.

After Rupture of the Membranes.—If the membranes are ruptured, inspection may reveal at once the oblique position of the child.

On the other hand, in neglected cases when the liquor amnii has drained away and the uterus strongly contracted round the child,

it may be impossible to palpate the child satisfactorily on account of the tenderness generally present.

Vaginal Examination.—Before Rupture of the Membranes.—The presenting part is found to be very high up, and in many cases cannot be felt unless the arm is prolapsed, whilst the bag of membranes will be large and sausage-shaped.

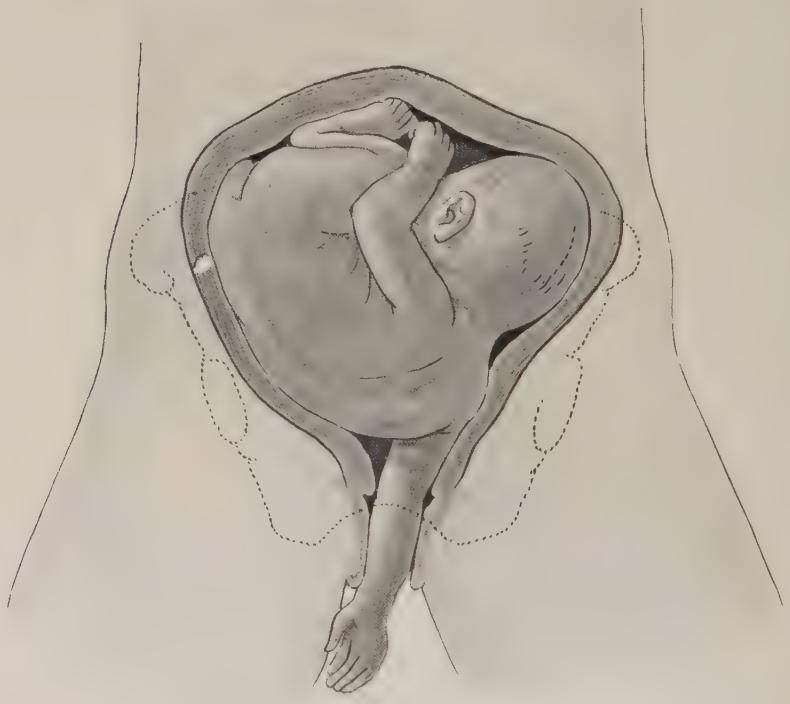


Fig. 102.—Oblique Position with Prolapse of the Arm.

After Rupture of the Membranes.—Shoulder.—The shoulder may be somewhat difficult to identify. When there is any doubt at all in these cases, the patient should be anæsthetised and the hand, if necessary, passed into the vagina and a complete internal examination made. What exactly will be felt depends upon the amount of dilatation of the cervix present. The shoulder may be identified by feeling the clavicle, acromion process, inferior angle of the scapula, or the ribs closely adjacent to it (Fig 101).

If the practitioner on feeling the ribs can pass his finger into the axilla, he will know by the cul-de-sac in which direction the head

lies, and if he can feel the clavicle he will know the position of the abdomen.

Arm.—In a large proportion of oblique positions the arm prolapses into the vagina soon after the membranes rupture (Fig. 102). The elbow has to be diagnosed from the knee and the hand from the foot, see pp. 335 and 336.

If one can shake hands with the child properly, the prolapsed arm will be the right. If the hands do not "fit," then it will be the left.

If the hand is drawn down and the fingers separated, the thumb will point towards the child's head and the palm towards its abdomen.

Abdomen and Back.—These varieties of presentations are much rarer, and more difficult to diagnose; in fact, the hand may have to be passed right into the uterus before the presentation can be identified.

When the presentation is discovered, a further careful examination should be made to ascertain the exact position of the child.

PROGNOSIS.

The prognosis is unfavourable for the mother and child. The mortality varies under different circumstances and with different observers, but roughly, taking all cases into consideration, it is for the mother about 10 per cent. and for the child nearly 50 per cent. Of course, if the case is seen early and efficiently treated, this mortality will be markedly decreased, especially on the side of the mother. The cause also may have much to do with the prognosis quite apart from the malposition.

The mother may die of ruptured uterus, exhaustion, hæmorrhage or sepsis. The uterus in neglected cases may rupture spontaneously as a result of the thinning of the lower segment, but statistics show that this disaster is most often caused by turning the child.

The percentage mortality of children associated with oblique position is very high, partly due to the fact that premature or dead children are not infrequently the cause of the malposition, partly to the measures necessary for delivering the child, and partly to prolapse of the cord, which is so common with an oblique position.

TREATMENT.

Although as a rule it is impossible for a child lying in an oblique position to be born, it may be remembered that under certain con-

ditions the labour may terminate naturally by one of the methods which are respectively known as "spontaneous version," "spontaneous evolution," or "spontaneous expulsion."

There is no need to discuss these occurrences here; to wait for delivery by one of them would be criminal negligence.

The treatment of oblique position of the child depends on when the case is first seen and the cause.

The patient may be first seen shortly before labour, or in labour before rupture of the membranes, or after rupture of the membranes.

During Pregnancy.—If an oblique position is discovered before labour, great care must be taken to ascertain the cause, for if it is due to a tumour, this must be properly treated; if it is due to contracted pelvis, measurements must be taken to see if the child can be born alive at term. If the pelvis is too narrow for this, Cæsarean section is indicated. If it is due to hydramnios, a dead child, twins, obliquity of the uterus or general laxity of the abdominal walls as in multigravidæ, then the malposition should be corrected and the child moved into a vertical position by external cephalic version, as it should also be if the pelvis is not too contracted for the birth of a living child. After the oblique position is rectified a binder must be put on the patient to keep the uterus vertical. The practitioner should examine the patient at frequent intervals so that the malposition can be recorrected if necessary.

Before Rupture of the Membranes.—If the membranes are unruptured, the treatment just detailed should be carried out, except in the case of placenta prævia, when de Ribes' bag should be inserted or immediate bipolar or internal podalic version performed.

If external version cannot be carried out and the cervix will admit two fingers, bipolar podalic or cephalic version should be performed, and if this fails the patient should be kept in bed until the cervix has dilated sufficiently to pass in the whole hand.

After Rupture of the Membranes.—When the Cervix will admit two Fingers and the Uterus is flaccid.—Under these circumstances the best treatment is to insert a de Ribes' bag, and when this is expelled internal version can at once be proceeded with.

Failing the possession of a bag, bipolar version should be attempted, pp. 604 and 608, and if this fails the cervix must be dilated with the fingers, and internal version carried out, see p. 726.

Cervix dilated enough to insert the Hand, Uterus flaccid.—Internal version should be performed, see p. 613.

Cervix admitting Hand, Uterus rigid.—If the case is first seen

after the membranes have ruptured and the cervx well dilated, so much liquor amnii may have drained away that it is found impossible to turn by the usual method of internal version owing to the uterus having contracted down on to the child. In these cases, if the operator is expert, and if he is *quite certain* that the child is alive and vigorous, that the uterus is *not in tonic contraction*, and that the signs of obstructed labour are absent, he may endeavour to correct the position of the child by placing a blunt hook round its knee, or a noose on its foot, and while applying traction by this means, he can, with his other hand in the vagina, endeavour to dislodge the shoulder by counter pressure. As a rule, the lower leg on the same side as the presenting shoulder is the best to select, but if there is much difficulty, traction on the opposite or upper leg may be successful.

If, however, these measures are not advisable, or, having been tried, have failed, the only treatment is to decapitate the child as quickly as possible.

If the neck is too high up to decapitate the head, the body should be eviscerated if necessary, or cut in two, and each half delivered separately.

For the details of decapitation, evisceration and spondylotomy see p. 623.

To overlook an oblique position of the child until the uterus has passed into tonic contraction and then to attempt to turn, as has been so often done, will lead to certain rupture of the uterus.

Cervix admits Two Fingers, Uterus rigid.—In such a formidable case as this, the risk to the patient will obviously, under any circumstances, be very great. We are of opinion that the safest course would be to perform a Cæsarean section or Cæsarean hysterectomy as circumstances dictated.

TWIN LABOUR.

DIAGNOSIS.

Before Birth of First Child.—Either before or during labour, twins may be diagnosed if two separate sets of fœtal heart sounds are heard. A certain diagnosis could be made by two observers auscultating at the same time over the two areas where the sounds are most distinct. If the rates vary, twins are present.

A diagnosis of twins is always justified if the sounds, having a maximum intensity at two different areas, diminish in intensity between them.

Twins may be suspected if the abdomen is markedly larger than

usual; but as there are many other conditions besides twins that enlarge the abdomen, this sign is of very little value.

If the patient is not fat, if the muscles are not rigid, and if the twins are lying side by side and not one behind the other, it may be possible to feel two bodies with a groove between, two heads and more limbs than usual. It so very often happens, however, that none of these signs can be detected, that their absence is of no practical use in the diagnosis.

After the First Child is Born.—Twins are probably most often diagnosed after the first child is born. If the uterus remains large after the birth of the first child, twins should be suspected and an examination should forthwith be made.

PROGNOSIS.

Mother.—The prognosis of twin labour is not quite so favourable as that of a normal labour, since there are certain complications peculiar to twins which, however, rarely arise. There is also more chance of post-partum hæmorrhage and perhaps sepsis, the latter on account of the interference which is more often necessary, whilst taking the same number of cases, albuminura and eclampsia are more frequent than in single births.

Children.—The prognosis for the children is much more serious than in single labour. This is due to the fact that in a large number of cases labour comes on prematurely, early rupture of the membranes and prolapse of an umbilical cord are commoner, whilst one or both of the children's lives may be sacrificed, owing to locking.

Normal Twin Labour.—The following sums up the course of twin labour in the majority of cases:

Both children present by the head.

Owing to the over-distension of the uterus the uterine pains are not very strong (primary inertia).

One bag of membranes presents, ruptures, and the child whose head is lowest is born first.

The uterine pains now cease for a varying period, on an average for about thirty minutes, after which the second bag of membranes ruptures and the second child is born quickly.

The two placentæ are then expelled, and after their birth the uterus tends to be rather flabby.

Abnormal Twin Labour.—Twin labour may be abnormal in that:

The presentation may differ from that just described.

The membranes may rupture early.

An umbilical cord may prolapse.

The interval between the birth of the children may be prolonged.
One child may be abnormal.
The placenta of the first child may follow its birth.
Both placentæ may come away after the birth of the first child.

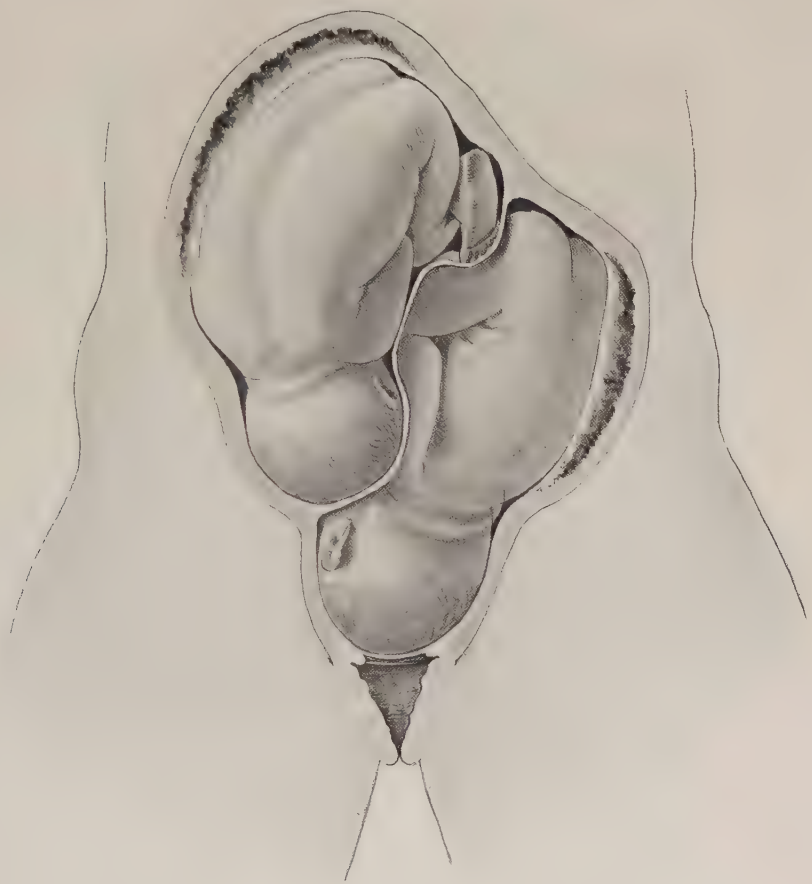


Fig. 103.—Locked Twins with both Heads presenting.

Post-partum hæmorrhage may occur.
The twins may be locked.

Other Presentations.—Twins may also present, one by the head and the other by the breech, either being lowest. Again, one child may present by the head or breech and the other be in an oblique position.

With the exception of the oblique positions, the exact manner of presentation is not of any particular significance.

Early Rupture of the Membranes.—Owing to the large amount of liquor amnii which often accompanies twins, and the fact that the

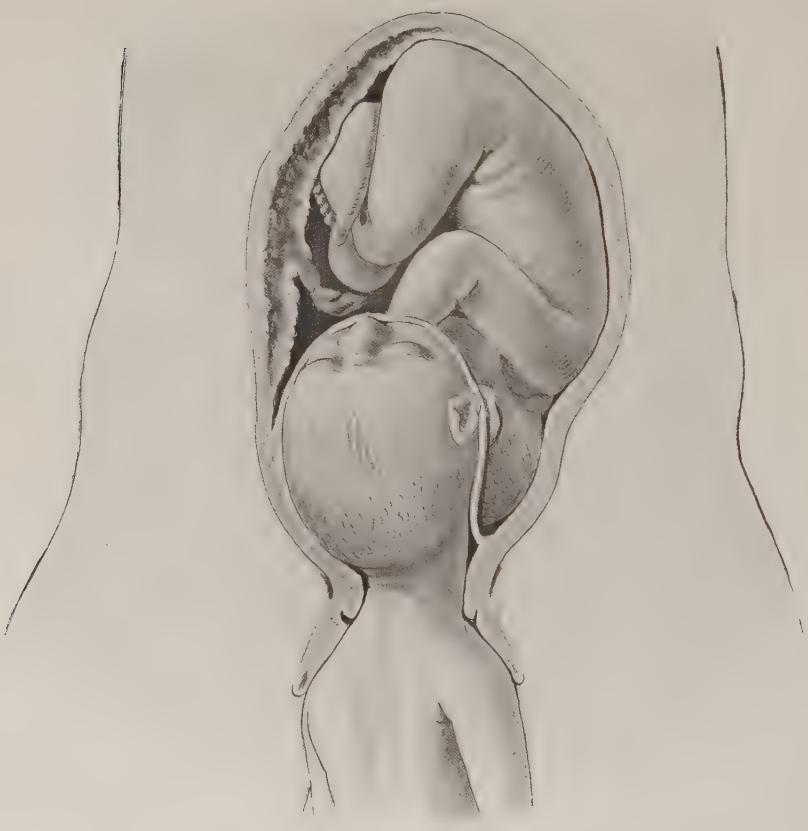


FIG. 104.—Twins Locked by fore-coming and after-coming Heads.

presenting part is so small, early rupture of the membranes not infrequently takes place, resulting in a certain amount of inertia, which prolongs labour, but this is somewhat counteracted by the small size of the children.

Prolapse of the Cord.—Prolapse of the cord may result from early rupture of the membranes, the position of the children and the smallness of the presenting part.

Delay between the Birth of the First and Second Children.—The average time is about thirty minutes. Cases will be met with in which this time is somewhat shortened or appreciably lengthened up to two or three hours. Cases have been reported where the

Fig. 105.—Locked Twins. Fore-coming Head and Oblique.

interval between the births have run into days. Such an event might be ascribed to the fertilisation of two ova at different dates in the same uterus, but before such a diagnosis is warranted, the presence of a double uterus must be excluded.

Abnormality of one Child.—Occasionally, owing to interference

with its circulation, one of the children may die or be badly developed. If it dies, it may become mummified and the other child pressing against it may so flatten it out that it has the appearance of a piece of parchment, and is called a "fœtus papyraceous." It may be expelled before or at term, and if before term, the second child may come away

FIG. 106.—Locked Twins. After-coming Head and Oblique.

or not. Sometimes the child does not die, but develops irregularly. It is then known as an acardiac fœtus, of which the commonest variety is one in which only the lower half of the body and limbs are developed. This may also be expelled or retained to full term.

Birth of one Placenta after the First Child.—Sometimes the birth of the first child is followed by that of its placenta, in which case hæmorrhage may supervene. The reported cases where

delivery of the second child has been postponed for a considerable interval have all had the first placenta born in this way.

Birth of both Placentæ or a common Placenta after Birth of First Child.—This is a very serious matter; hæmorrhage will supervene, and the second child will perish unless it is immediately delivered.

Post-partum Hæmorrhage.—Hæmorrhage after the birth of the first child is likely to occur if its placenta or both placentæ immediately follow it. Hæmorrhage after the birth of the second child may also occur from exhaustion of the uterus.

Locked Twins.—The locking of twins is exceeding rare. Usually the children have a common amnion.

There are four varieties of locked twins, depending on whether both bodies are lying vertical or one vertical and one oblique.

Both Bodies Vertical.—When both children are vertical, the locking may accompany either a bicephalic or a breech-cephalic presentation.

Locking with both Heads Presenting.—When both children present by the vertex, and the head of the upper child is jammed in between the head and thorax of the lower child (Fig. 103).

Locking with fore-coming and after-coming Head.—In this case the head of the lowest or breech child is jammed against the head and thorax of the first child, or both occiputs may be engaged or both chins, or an occiput and chin (Fig. 104).

One Child Vertical and one Oblique.—There are two varieties, depending upon the presentation of the vertical child: Fore-coming head and oblique and after-coming head and oblique.

Fore-coming Head and Oblique.—In this form one child presents by the vertex, but its birth is prevented owing to its shoulders catching against some part of the body of the oblique child (Fig. 105).

After-coming Head and Oblique.—In this case the first child is born as far as its body, but further progress is prevented by its head catching against some part of the oblique child (Fig. 106).

PROGNOSIS.

This complication is a serious one both for the mother and children, more especially for the latter, since one will certainly be dead. Cases have been reported in which, when both bodies were vertical, the locked heads managed to escape through the pelvis without assistance, but it is obvious that in this case the children must have been very premature.

TREATMENT.

Normal Twin Labour.—1. After the birth of the first child

be sure to tie the divided end of the umbilical cord, lest the placental circulation is common to the two children.

2. After the ligature has been applied, examine the presenting part. If it is a transverse, correct it.

3. At the end of half an hour, if the second bag of membranes has not already ruptured, rupture it.

4. During the birth of the second child, special care should be taken to keep one hand firmly on the uterus as a prophylactic against post-partum hæmorrhage.

5. Manage the third stage of labour very carefully.

6. Stay with the patient at least an hour after delivery in case of recurrent hæmorrhage.

Abnormal Twin Labour.—**Inertia.**—If the uterus is much distended with liquor amnii and the pains are weak, the membranes may be ruptured somewhat before full dilatation of the os. If the second stage is long, either with the first or second child, and, if uterine pains are present, the forceps may be used to expedite delivery.

Prolapse of Cord.—For the treatment of this see p. 430.

Birth of the Placenta after Birth of First Child.—If hæmorrhage supervenes, the birth of the second child must be expedited. If not, the case may be left if there is a certain diagnosis of double uterus, otherwise the second bag of membranes should be ruptured in due time and labour conducted as already stated.

Birth of Common Placenta or both Placentæ after Birth of First Child.—Deliver the second child as soon as possible.

Post-partum Hæmorrhage.—See p. 271.

Locked Twins.—If in a case of locked twins it is determined to deliver by the vagina, the following procedures should be carried out in the order given, trying the first method, and, if this fails, proceeding to the second, and so forth.

Both Heads Presenting.—1. Push the upper head out of the way.

2. Deliver the lower child with forceps.

3. Perforate the lower head and deliver the child.

4. Perforate the upper head, deliver the lower child, then the upper.

Fore-coming and After-coming Head.—1. Push up the lower head.

2. Decapitate the upper child.

3. Decapitate the lower child and deliver the trunk. Then deliver the upper child, and lastly the decapitated head.

Fore-coming Head and Oblique.—1. Turn the oblique child, and then deliver the vertical child with forceps.

2. Decapitate the oblique child, deliver its body, and then deliver the vertical child with forceps.

After-coming Head and Oblique.—1. Turn the oblique child, and deliver the vertical child by traction or forceps.

2. Decapitate the vertical child, and deliver the oblique child by version.

Cæsarean Section as a Treatment for Locked Twins.—As the vaginal delivery of locked twins is often very difficult and usually results in at least one of the children being born dead, we are of opinion that when the woman is at or near full term, and the children deemed to be alive and the circumstances favourable, Cæsarean section is the correct method of delivery. In such a case one of us lately was able to save both children by this method, although the additional complication of a prolapsed cord was present.

CHAPTER XXII.

Labour Complicated by Anomalies of the Pelvis.

CONTRACTED PELVIS.

PRELIMINARY CONSIDERATIONS.

The diagnosis of a contracted pelvis is based on actual measurements between certain bony points.

The measurements are divided into two groups, external and internal.

External Measurements.

The principal external "diameters" are three in number:

1. The anterior spinous diameter, measured between the outer borders of the anterior superior iliac spines (Fig. 107).

2. The intercristal diameter, measured between the widest points on the iliac crests.

3. The posterior spinous diameter, measured between the posterior superior iliac spines.

It is, however, to be remarked that under normal circumstances these diameters vary somewhat in different women, so that it is not only a question of their actual size, but also their relative sizes as compared with one another.

Thus in an average pelvis the measurements are as follows:

Anterior spinous, 10 inches.
Intercristal, 11 ,,
Posterior spinous, 4 ,,

In women of big physique, however, the following may be found:

Anterior spinous, $10\frac{1}{2}$ inches.
Intercristal, $11\frac{1}{2}$,,
Posterior spinous, $4\frac{1}{4}$,,

On the other hand, in small but normally constructed individuals the measurements may be considerably less, thus:

Anterior spinous, 9 inches.
Intercristal, 10 ,,
Posterior spinous, $3\frac{3}{4}$,,

In all of these cases, however, a roughly constant ratio is observed, which may be thus expressed: The anterior spinous diameter should be not less than 1 inch shorter than the intercristal diameter, and should stand in a proportion of 5 to 2 to the posterior spinous diameter (Fig. 108).

These external measurements are most accurately taken by means of callipers, but in the absence of that instrument a tape or ruler

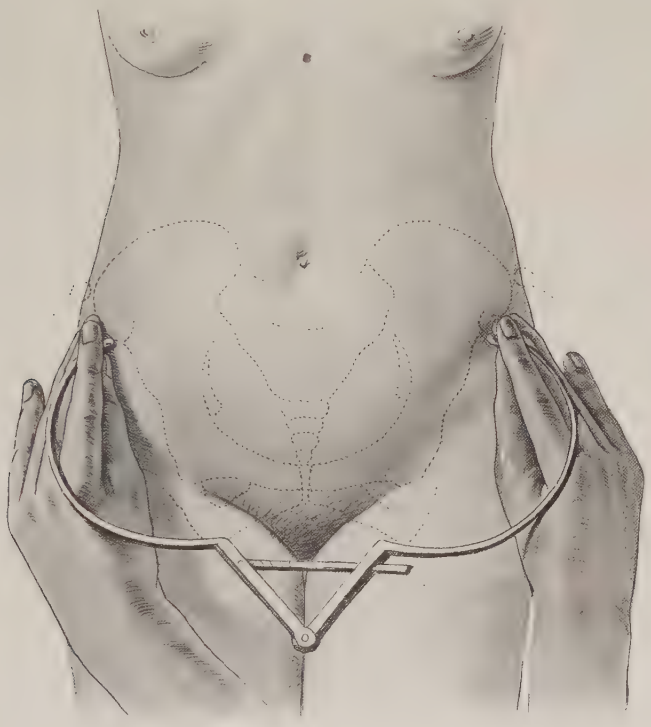


Fig. 107.—Measuring the Anterior Spinous Diameter.

will suffice for the measurements between the spines. The intercristal can then be roughly estimated by judging by the eye how much it exceeds the anterior spinous diameter. A useful substitute for callipers are the fingers, an average man's hand spanning 9 inches from little finger to thumb, while the distance from the top of the index finger to the crest of its knuckle is 4 inches. By such rough-and-ready methods the practitioner can make a very fairly accurate estimate of the principal external measurements.

Internal Measurements.

Of these by far the most important is the true conjugate diameter, which is defined as being the shortest distance between the promontory of the sacrum and the back of the symphysis pubis.

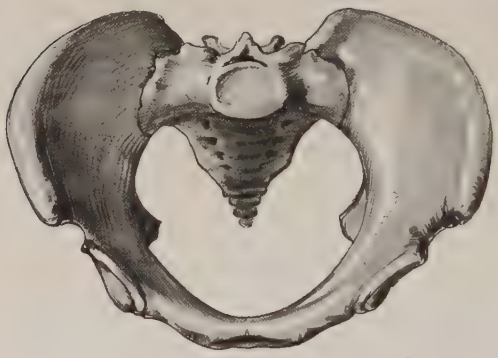


Fig. 108.—Normal Pelvis seen from above.

In a normal individual it should measure from 4 to $4\frac{1}{4}$ inches. It can be directly measured by means of special callipers or by the hand introduced into the pelvis. The first method is only available to those who own the necessary instrument, while the second is only possible immediately after labour.

It is therefore estimated, as a rule, from the ascertained length

Fig. 109.—Estimating the Diagonal Conjugate.

of the "diagonal" conjugate diameter, *i.e.*, the measurement between the promontory and the subpubic angle.

The diagonal conjugate is thus measured:

The index and middle fingers are passed up the vagina until the tip of the latter touches the sacral promontory. The point at which the subpubic angle impinges on the index finger is then marked by the finger of the other hand, and the examining hand being

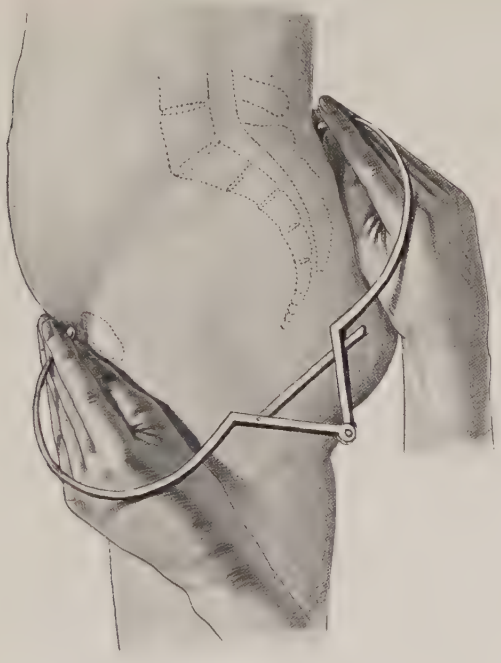


Fig. 110.—Measuring the External Conjugate Diameter.

withdrawn, the distance between the tip of the middle finger and the mark on the index finger is measured (Fig. 109).

In a normal pelvis the true conjugate is three-quarters of an inch shorter than the diagonal conjugate.

Another method of estimating the true conjugate diameter is to take the external conjugate diameter, *i.e.*, the distance between the prominence of the last lumbar spine and the front surface of the pubic symphysis (Fig. 110). If the last lumbar spine cannot be felt its position is marked by taking a point one inch above the middle of a line joining the posterior iliac spines, which can always be felt (Fig. 111). This measurement can only be taken with callipers; usually it amounts to $7\frac{3}{4}$ inches, and $3\frac{1}{2}$ inches should

therefore be deducted to estimate the true conjugate. This method is, however, unreliable, owing to the normal variations of the "external conjugate."

The rest of the internal measurements of the pelvis, namely, those of the cavity and outlet, are usually roughly ascertained by sense of touch, the examiner sweeping his finger round the pelvic

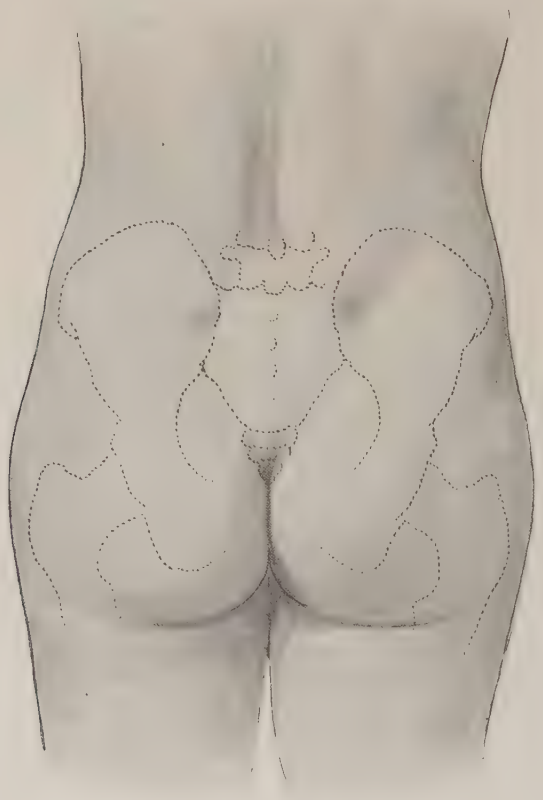


Fig. 111.—Position of the posterior Iliac Spines and Spine of last Lumbar Vertebra.

cavity and endeavouring to estimate the total amount of room there. The antero-posterior diameter of the outlet is measured in the same manner as the diagonal conjugate, but the tip of the finger impinges on the sacro-coccygeal joint (Fig. 112).

Great accuracy is rarely required except upon academic grounds, but, if it be desired, then specially constructed callipers are a necessity, such as those of Skutsch.

THE VARIETIES OF CONTRACTED PELVIS.

From the point of view of practical obstetrics the several varieties of contracted pelvis are conveniently grouped under two heads:

1. Where the obstruction is situated at the brim.
2. Where the obstruction is situated in the cavity and outlet.

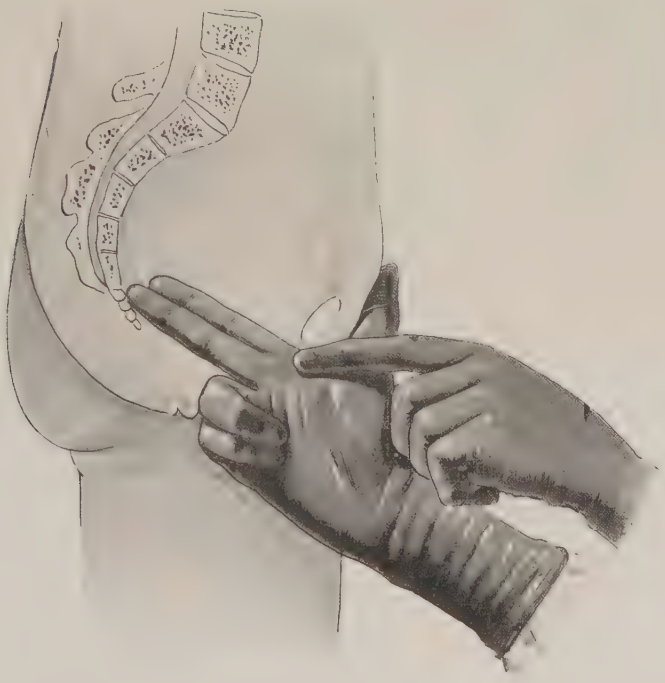


FIG. 112.—Estimating the Antero-posterior Diameter of the outlet.

PELVES IN WHICH THE CONTRACTION IS SITUATED AT THE BRIM.

This group comprises the various types of flat pelvis:

The non-rickety flat or ovate pelvis.
The rickety flat pelvis.
The malacosteon pelvis.
The pelvis of congenital dislocation of the hips.
The spondylolisthetic pelvis.
The "pelvis obtecta" (extreme kyphosis).

In all of them the upper entrance into the pelvis is narrowed from before backwards, either by the projecting promontory (ovate, rickety, and malacosteon pelvis), the dislocated fifth lumbar

vertebra (spondylolisthetic pelvis), or the extreme forward slope of the lumbar spine (pelvis obtecta).

The Non-rickety Flat or Ovate Pelvis.—In this type the sacrum projects forwards and the cartilage between the second and third vertebræ is unduly prominent so that a false promontory is formed. The deformity results in a narrowing of the true conjugate and an increase or relative increase in the transverse diameter at the brim. The remaining diameters of the true pelvis are usually normal, except that the difference between the interspinous and intercristal diameters may be slightly lessened (Fig. 113).

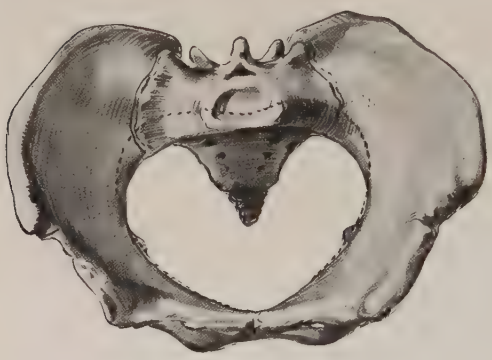


FIG. 113.—Ovate Pelvis.

The Rickety Flat Pelvis.—In this type the promontory of the sacrum projects forward, with the result that the inlet is kidney-shaped or even in marked cases tri-radiate or a figure of 8. The cavity of the pelvis is shallow and at the outlet the antero-posterior and transverse diameters are relatively enlarged. The intercristal diameter and the anterior spinous diameter coincide, that is the latter diameter represents the widest points between the crests. The posterior spinous diameter is diminished both actually and relatively to the anterior spinous diameter, to which it may bear a relation as low as 1 to 5, see p. 366.

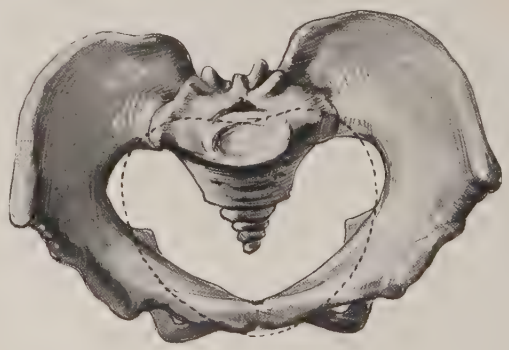


FIG. 114.—Large flat Rickety Pelvis.

Rickety pelves may be divided into three groups: (1) The large rickety pelvis, in which the pelvis, as a whole, is not diminished in size though the brim is flattened. The conjugate is rarely lower than $3\frac{1}{4}$ inches in these pelves (Fig. 114). (2) The small rickety pelvis, in which the flattening of the brim is accompanied by general stunting of the bony growth. The conjugate in these cases may

fall as low as $2\frac{1}{4}$ inches (Fig. 115). (3) The very small rickety pelvis, in which, in addition to the flattening and stunting, the ischial and pubic rami are in-driven by the pressure of the femora, producing a tri-radiate or even figure of 8 shape of the inlet (pseudo-osteo-malacosteon pelvis). In such, the available conjugate diameter may be less than an inch (Fig. 116).

With the more marked degrees of rickety deformity of the pelvis more or less dwarfism is always associated, while signs of rickets may be observed in other parts of the body.

Fig. 115.—Small flat Pelvis.

The Malacosteon Pelvis.—This pelvis resembles the tri-radiate rickety pelvis, but there is no stunting of the bones, the deformity is much more irregular and the outlet of the pelvis is frequently quite as contracted as the inlet (Fig. 117), see p. 316.

The Pelvis of Congenital Dislocation of the Hips.—This deformity produces slight flattening of the pelvic brim, but without diminution of its capacity. It rarely gives rise to difficulty in labour (Fig. 118).

The Spondylolisthetic Pelvis.—This very rare form of deformity is due to dislocation of the body of the fifth lumbar vertebra from violence or some developmental error. As a result of the inferior surface of the vertebra uniting with the anterior surface of the promontory of the sacrum, there is marked lumbar lordosis, and the lumbar vertebræ projecting into the cavity diminish the size of the pelvic inlet.

Fig. 116.—Rickety Tri-radiate Pelvis.

The Pelvis Obtecta.—This type of pelvis is similar to the spondylolisthetic pelvis, but is caused by caries of the body of the last lumbar vertebra producing extreme kyphosis of the spine so that it slopes forward sufficiently to obstruct the pelvic inlet.

THE EFFECT OF A FLAT PELVIS.

As the lower fœtal pole is unable to descend into the pelvis, a condition of pendulous abdomen is brought about (Fig. 119). Examination reveals the child lying abnormally high, the head (if it be lowermost) freely movable above the brim, and the fœtal heart heard with maximum distinctness on a level with the umbilicus.

FIG. 117.—The Malacosteon Pelvis.

When labour begins, the normal "ball-valve" action of the head in the lower uterine segment is inoperative, with the result that the membranes first protrude excessively through the cervix ("glove-finger protrusion"), and subsequently rupture prematurely. The head being unable to descend, all further dilatation of the os is then suspended.

The effect on the presentation varies. On account of the abnormal mobility of the fœtus, an oblique lie is common, the head being situated in one or other ilia fossa and the shoulder presenting.

If the head engages at all, one of three things may happen:

In the first, the biparietal diameter becoming nipped in the

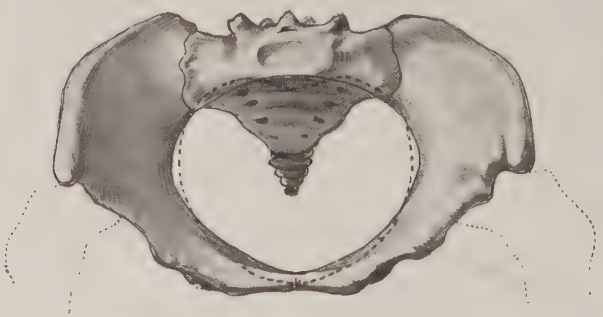


FIG. 118.—Congenital Dislocation of the Hips.

contracted conjugate, the head extends until the brow presents and the vertico-mental diameter lies across the pelvis. In this position it impacts (impacted brow).

In the second, extension continues until the face presents, in

which position the head may be squeezed past the promontory and eventually delivered.

In the third event, which can only occur if the fœtal skull be relatively small, the bitemporal diameter lies in and is nipped by the contracted conjugate, and extreme flexion of the head occurs, in

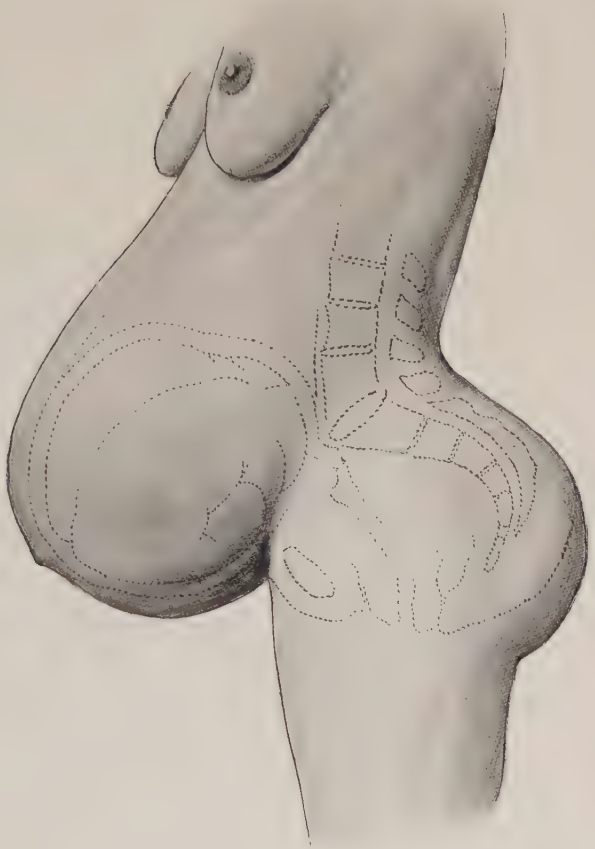


Fig. 119.—Flat Pelvis. Pendulous Abdomen.

which position it is driven through the brim. Lateral flexion of the head upon the neck, producing anterior or posterior obliquity (asynclitism), is common in labour in flat pelvis. Anterior parietal obliquity (Naegele's obliquity) is favourable, in that it substitutes the subparieto-superparietal diameter of $3\frac{1}{2}$ inches for the biparietal diameter of $3\frac{3}{4}$ inches. Posterior obliquity is unfavourable.

If the head engages, more or less severe pressure is exercised upon it, moulding is extreme in its transverse diameters, and a deep grooving or flattened depression of the vault bones may occur. A child so subjected is born either dead or in a state of white asphyxia.

If the head does not engage, or engaging becomes impacted in the brim, a serious state of affairs is set up. The liquor amnii rapidly drains away, so that the full force of the uterine contractions is brought to bear on the child.

Movable parts such as the umbilical cord or a limb may be expressed into the vagina by the sheer force of the uterine musculature, see p. 433, while the signs indicating that fœtal death is imminent will appear, namely, the presence of meconium in the vagina, though the head is presenting, and a pulse rate under 110.

The uterus faced by an *impasse* contracts more and more strongly, while relaxation between the pains is less and less perfect, until eventually tonic contraction supervenes with its classical phenomena, see p. 297.

PROGNOSIS.

The degree to which a flattened pelvis affects labour depends on the extent of the deformity.

For practical purposes it may be taken that a true conjugate of less than $3\frac{1}{4}$ inches is incompatible with the live birth of a viable child.

Above this limit it is undoubted that the uterus not infrequently expels even full-term children unaided. This is especially the case in first labours, in which the musculature is vigorous and the child relatively small. The head in such instances is usually driven through in hyperflexion, as already described, for it is to be remembered that in even high degrees of pelvic flattening the cavity and outlet are but little reduced in size, so that once past the contracted brim the further passage of the head is unobstructed. In subsequent labours, however, the chances of natural delivery diminish greatly, because the heads of successive children tend to increase in size, while the uterine wall becomes less vigorous.

The great likelihood of malpresentation in these pelves further lessens the probability of natural birth, while the severe compression that the fœtal skull must undergo, and the frequency with which the cord prolapses below the head immediately after rupture of the membranes, renders the outlook for the child bad in the extreme.

Labours with flattened pelves are, of course, associated with an

increased mortality and morbidity rate as compared with normal cases, both on account of the bruising of the tissues and the necessary operative interference.

The children so born are often dead, or die soon after birth from shock or injury, see p. 739.

DIAGNOSIS

A flat pelvis should be suspected if the patient presents obvious signs of rickets, especially associated with a markedly pendulous abdomen. The discovery that the anterior spinous diameter coincides with the intercristal diameter, *i.e.*, that it is the widest diameter between the iliac crests, strongly suggests flattening of the brim.

In estimating the true conjugate diameter not more than half an inch should be subtracted from the diagonal conjugate.

TREAMENT.

In regard to treatment, flat pelves may be conveniently divided into three groups, according to the size of the true conjugate diameter. These groups are as follows :

1. *The large flat pelvis.* True conjugate $3\frac{1}{4}$ inches or over. Through such a pelvis a living child may be delivered and survive.

2. *The small flat pelvis.* True conjugate between $2\frac{1}{4}$ and $3\frac{1}{4}$ inches. Through such a pelvis a living child either cannot be delivered, or being delivered will not survive.

3. *The very small flat pelvis.* True conjugate less than $2\frac{1}{4}$ inches. Through such a pelvis delivery of a viable child alive or dead is impossible.

1. The Large Flat Pelvis. True Conjugate $3\frac{1}{4}$ Inches or Over.

In such cases delivery may be effected either by nature or art. In the latter connection we consider dilatation of the cervix, forceps, version, Cæsarean section, perforation of the child's head, and division of the pelvis.

Natural Expulsion at Term.—As has been said, the uterus unaided may succeed in driving the child past the obstruction, especially in a pelvis having a true conjugate of $3\frac{1}{2}$ inches or over.

If the patient is seen in pregnancy, this possibility should not deter the practitioner from advising interference, but where the deformity is first recognised during labour, it may be justifiable to withhold operative measures for a while in the hope that the uterus may overcome the difficulty by itself.

The justifying circumstances may be thus summed up. The cervix fairly dilated, the head engaging in full flexion, anterior parietal

obliquity present, the pains normal and the condition of the patient good. These indications are strengthened if it be a first labour. With such conditions forceps traction or other measures should be postponed in order to give time for the head to mould. Many cases so treated will deliver themselves, but it is obvious that the practitioner must keep the progress of the labour under constant supervision and be prepared to act directly it is apparent that the natural forces are insufficient.

On the other hand, there are many cases in which a waiting policy is simply waste of time. The circumstances that indicate immediate interference may be thus summed up. The head not engaged or engaged in a faulty position, the cervix less than half dilated, the contractions abnormal or the patient's condition unsatisfactory.

Under these circumstances operative measures are indicated at once, for the chances of natural delivery are small or none.

Artificial Dilatation of the Cervix.—One of the chief difficulties of a flattened pelvis is the frequency with which the membranes rupture before the cervix is fully dilated. In this event it is inadvisable to leave the completion of the dilatation to the chance of the head coming down, for not only may the latter fail to do so, but even if it does, the process entails much pressure on the fœtus.

A cervix only partially dilated not only hampers the operator's manœuvres, but is certain to be more or less badly torn in the subsequent passage of the child, see p. 452.

For these reasons it is expedient in all cases in which no contra-indication exists to complete the dilatation of the cervix by the insertion of de Ribes' bag.

The contra-indications referred to are partial or complete tonic contraction, in which the insertion of a bag may precipitate rupture of the lower segment, and a state of the patient so unsatisfactory as to call for immediate evacuation of the uterus by craniotomy or such other operation.

In the event of these contra-indications, destruction of the child is urgently demanded, and if the os be not sufficiently dilated to perform the operation, it must be enlarged not by a bag, but by cutting or a mechanical dilator.

Forceps Traction.—The use of forceps in a large flat pelvis requires careful consideration, for while there are certain conditions in which their application is proper, there are others in which it is strongly contra-indicated.

The head in these cases has not entered or only partially entered the brim, and therefore still lies within the cervix. Under these

circumstances the "high-forceps operation" has two disadvantages firstly, that the blades of the instrument are very likely to grip the head in a faulty position, and secondly, that in any case the head must be pulled through the partially dilated cervix.

The seriousness of the first of these is obvious, while as regards the second, it should be remembered that it is almost impossible to drag a head through the cervix without more or less extensively rupturing it unless the os is at least three-quarters dilated.

For these reasons the forceps should never be applied to a head that has not engaged, nor to one engaging in an abnormal position. In regard to the latter, it may be possible to manually rectify the presentation beforehand.

Similarly the forceps should not be applied through an os less than two-thirds dilated. If on other counts the case appears suitable for these instruments, the requisite expansion of the cervical canal should first be obtained by the insertion of a de Ribes' bag.

To give the best chances of success it is absolutely necessary to employ axis-traction forceps, for it is impossible to apply traction correctly in the axis of the pelvic brim with instruments lacking this attachment.

The length of time during which it may be regarded as proper to persist in attempts to pull the head past the flattened brim will vary in different cases. In general it may be said that where with the head in a favourable position no advance has been effected by strong axis traction in half an hour, it is probable that this method of delivery is going to fail. The attempt may be persisted in for a little longer, but certainly after three-quarters of an hour's fruitless pulling the instruments should be laid aside.

Nothing is more lamentable than to hear of a case in which forceps have been applied on and off for many hours. Such protracted efforts severely bruise the mother's soft parts, while the child, even if born alive, will probably die soon afterwards of white asphyxia, the result of a fractured skull or other injuries.

The amount of force which it is justifiable to use is also a matter of question, but it may be roughly stated that it should not exceed the full force of the operator's arm applied through axis-traction forceps. The weight of the body exercised to supplement this is dangerous.

The maternal tissues will stand great pressure if only applied for a short time, but prolonged compression is likely to be followed by necrosis and sloughing.

If in spite of forceps traction the head cannot be got through the brim, four possible courses remain to the practitioner:

1. To perforate the head.
2. To turn the child.
3. To perform division of the pelvis.
4. To perform Cæsarean section.

Perforation is the easiest resort, and under the circumstances of general practice it is, as a rule, the best.

Further measures to obtain a living child are not only liable to fail, but bring with them a considerably increased mortality and morbidity risk to the mother.

Damage to or infection of the genital canal quite apart from their immediate gravity are serious, in that they are often followed by sterility. Thus heroic attempts to obtain a live child may not only be unsuccessful, but may result in changes that render further conception impossible, whereas timely destruction of the child should leave behind it no such disability, and when the woman again becomes pregnant, induction of labour can be successfully carried out.

It is further to be borne in mind that little credit will accrue to the practitioner if his well-meant persistence only results in disaster.

Where the state of the child is precarious, or it is obviously dead, perforation of the head is the only course to be entertained.

In any case, therefore, where with a large flat pelvis, forceps traction has failed to get the head through, destruction of the child probably holds out the least risk to the mother, and in private practice this fact should be explained to the husband or nearest relative before embarking on any other measures.

Version as a primary method of treatment for labour obstructed by a large flat pelvis will be presently considered. As a resort after forceps traction has failed, it is not to be commended, provided that that instrument has been correctly used according to the indications previously given, for if with a head well flexed and partially engaged, and a cervix fairly dilated, axis traction has not been able to succeed, there is no likelihood that a better result will be obtained with the after-coming head. Further, the patient will already have been in labour some time, and in all probability most of the liquor amnii will have drained away and the uterus be rigid.

Where, however, after failure of the forceps, it is discovered that the head is lying in a bad position, it would be justifiable to turn, provided that the uterus is lax and the child alive.

Division of the Pelvis.—It is held by many authorities that this should only be employed as an adjunct to forceps traction. If this view is practised it is certain that it should be early resorted to, for if performed after the head has been subjected to prolonged compression, the child is very likely to be stillborn.

Cæsarean Section as a method of treatment after forceps traction has failed requires much consideration. As will be shown later, this operation has a much-increased risk if carried out after the passage of anything into the uterus.

This risk, which is due to the chance of introduced sepsis, obviously varies according to the nature of the previous interference and the manner in which it has been carried out.

On the whole, it may be said that the idea of Cæsarean section after forceps have failed is very rarely to be entertained.

In exceptional circumstances where the latter operation has been carried out with strict aseptic and antiseptic precautions, and where the child is in good condition and the mother and her husband are cognisant of and willing to accept the extra risk, the practitioner would be justified in performing it.

Version.—The indications for podalic version as a primary means of treating labour obstructed by a large flat pelvis are the opposite of those for the application of forceps.

By turning the child a malpresentation of the head or prolapse of the cord, both common events with a flat pelvis, are got rid of, while by pulling down one leg the half breech is made to act as an efficient dilator for an only partially opened cervix.

These, then, are the indications: Malpresentation of the head, prolapse of the cord, or an external os less than two-thirds dilated.

The contra-indications are still more important. It has been already stated that forceps are preferable if the head, presenting favourably, has partially engaged and the cervix is at least two-thirds dilated. Further, it is useless to turn the child if the disparity between the head and pelvis is so great that though the former be presenting normally it is unable to make any entrance into the brim, for the difficulty with the after-coming head would be such that the child would perish. Finally, the operation is absolutely contra-indicated by rigidity of the uterine wall.

After version has been carried out, the chief difficulty will be the delivery of the after-coming head.

In a case of flat pelvis it is most important not to attempt this until both arms have been brought right down. The head should then be delivered by face and shoulder traction aided by supra-pubic pressure.

The head should be adjusted beforehand so that it enters the brim in the transverse diameter, and the exercise of traction from below and pressure from above should be simultaneous. By these means considerable force can be applied.

If it is found impossible to deliver the after-coming head by

these means, or if during the manipulations the cord stops beating, further attempts should be abandoned and the head should be perforated, see pp. 356 and 627.

Induction of Labour.—Induction of labour gives good results when performed for a large flat pelvis with a true conjugate of $3\frac{1}{2}$ inches or over, and where the deformity is recognised sufficiently early in pregnancy it should be the course of election, saving those cases in which it has already been tried and failed.

The date at which it is advisable to bring on labour will depend on the size of the true conjugate diameter and on the relation borne by the size of the head to that of the brim.

The methods of measuring the pelvic diameters and the data on which the duration of any given pregnancy is estimated are discussed on pp. 17 and 378.

The Rule of Weeks.—This rule is founded on the ascertained length of the conjugate diameter and the duration of the pregnancy in weeks. It takes no account of variations in the size of the child's head. It may be stated as follows:

Measurement of True Conjugate.	Period of Pregnancy when Induction should be performed.
$3\frac{1}{4}$ inches	32nd week
$3\frac{1}{2}$ „	36th „
$3\frac{3}{4}$ „	38th „

It is, on the whole, a reliable method if the conjugate measurement and the duration of pregnancy are accurately determined.

It is least dependable in the later weeks because of the increasing variability in the size of the child's head.

Estimation of the Size of the Head.—There are various ways of doing this. They have lately been discussed in an interesting manner by Ellice Macdonald,[1] who has originated a method of his own, which is as follows: The bladder must be emptied and the position of the head must be accurately palpated. The occiput and sinciput having been defined, the distance between these points is measured with ordinary callipers, to the ends of which loops of adhesive plaster have been fixed, through which the first and second fingers of each hand are passed, so that the head can be held steady during the measurement (Fig. 120). According to Macdonald, the measurement taken represents the occipito-frontal diameter without deduction.

Macdonald further states that if it is desired to find the biparietal diameter 1 centimetre should be subtracted if the occipito-frontal

[1] *The Journal of Obstetrics and Gynæcology of the British Empire*, Vol. XXI. No. 2.

measures 10 centimetres, 1·9 centimetres if it measures 11 centimetres, 2·2 centimetres if it measures 11·5 centimetres, and 2·5 centimetres if it measures 12·5 centimetres. By this means the most important transverse diameter of the head is estimated.

He points out that the weight of the child bears a pretty constant relation to the occipito-frontal diameter.

Roughly it may be taken that if this measures 11·5 centimetres the weight of the child is about 3,300 grammes ($7\frac{1}{3}$ lb.). The

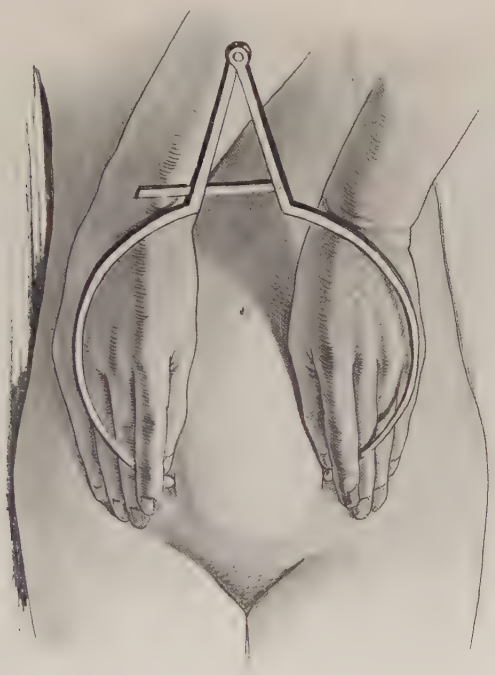


Fig. 120.—Measuring the Child's Head with Callipers.

weight of the child also bears a relation to the pubo-fundal measurement as estimated by this author's method, see p. 20. Thus if it amounts to 35 centimetres the weight of the child may be taken at 3,300 grammes, and a deduction of 200 grammes should be made for every centimetre below 35 centimetres.

Thus by correlating the pubo-fundal measurement, the fronto-occipital diameter, and the estimated weight of the child, an accurate idea may be obtained of the size of the fœtus in relation to the known measurements of the pelvis.

An estimate of the size of the fœtal head can also be obtained by

Munro Kerr's method, in which one hand is applied from the abdomen, while the other with two fingers in the vagina and the thumb over the pubes grips the head in the sagittal plane (Fig. 121).

A third device consists in placing the patient in a semi-reclining posture on the edge of a bed or table so that the pelvic brim is horizontal, while the examiner with a couple of fingers in the vagina presses the head downwards by his other hand placed on the fundus of the uterus, and thus bimanually ascertains the ease with which it can be forced into the brim.

In regard to these various methods it may be stated that they are

FIG. 121.—Estimating the Size of the Fœtal Head (Munro Kerr's Method).

all useful and should be employed as controls to one another in all cases in which induction of labour is contemplated.

It is, of course, very important to postpone the birth of the child as long as is compatible with its safe passage through the pelvis, particularly in the earlier part of the period under discussion, since every week that can be added to its intra-uterine life improves its chance of ultimate survival.

The induction is as a rule best effected by bougies, followed if need be by the use of de Ribes' bag, see p. 719.

Induction may fail either because the labour though premature is still difficult, or because the child though born alive dies afterwards of immaturity.

If in spite of the induction, obstruction to the passage of the head is encountered, this should be treated either by forceps or by internal version. Failing delivery by these means, perforation should be performed.

We are of opinion that division of the pelvis or Cæsarean section under such circumstances are both unjustifiable if the child be under thirty-eight weeks.

The course to be pursued in the event of another pregnancy is a matter for consideration.

If the death of the child was solely due to induction not having been performed early enough, and if still earlier induction with good hope of a living child was feasible, then a repetition of the operation at this earlier date may be carried out.

If, however, the earliest date was chosen in the first instance, then at the next pregnancy the patient should be advised to undergo Cæsarean section at term.

Induction of labour before the thirty-second week is a proceeding not worth the carrying out as far as the life of the child is concerned. From the thirty-second to the thirty-fourth week, the prospects of rearing the child are precarious. After this date the outlook much improves, and from the thirty-sixth week onwards the chances of the survival of the child are almost as good as those of one at term provided it is properly cared for.

Cæsarean Section.—Cæsarean section as a primary method of delivery with a large flat pelvis has to be considered under three distinct sets of circumstances :

1. *Conjugate* $3\frac{1}{4}$ *to* $3\frac{1}{2}$ *inches.*—Where the true conjugate is estimated at anything between $3\frac{1}{4}$ to $3\frac{1}{2}$ inches and the woman presents herself before the thirty-second week of pregnancy, *i.e.*, before the date at which induction would be performed on the lowest of these two limits, Cæsarean section at term has to be considered as a legitimate alternative to the former proceeding, for it is certain that of children born between the thirty-second and thirty-fourth week, many fail to ultimately survive.

The patient should therefore be given the choice between induction with its practical absence of danger to her and its undoubted risk to the child, and the abdominal operation with its definite maternal mortality and its favourable outlook for the infant.

2. *Previous Induction Unsuccessful.*—In this case Cæsarean section is generally advisable (see above), as it is if the patient presents herself too late for induction.

3. *Where the Patient is in Labour.*—If the patient is already in labour, Cæsarean section is an alternative to forceps traction,

version and division of the pelvis. We have shown that the attempt to deliver by forceps traction or by version is not likely to succeed where the head, though presenting favourably, is totally unable to enter the brim. Such a condition is, of course, most likely to occur with the lower limit of the large flat pelvis, *i.e.*, with a true conjugate of $3\frac{1}{4}$ to $3\frac{1}{2}$ inches. Where, however, the child is a large one the head may be wholly disproportionate, even to a pelvis with a true conjugate measuring 4 inches. In such an event the obstetrician should carefully consider the question of performing Cæsarean section, for the operation if carried out under favourable circumstances, and before attempts to deliver by the vagina have been made, will in all probability prove successful for both the mother and child.

Before deciding on Cæsarean section it is, of course, necessary to ascertain that the child is alive and vigorous, and that the mother's condition is good.

The alternatives are, either to proceed with perforation at once or to risk the attempt of delivery by forceps or version, failure of either of which will probably necessitate perforation, though in the first case division of the pelvis might be resorted to.

The action of the obstetrician will be guided by the condition he finds, the wish of the patient, and the means at his disposal. It cannot be doubted but that the mortality and morbidity of a severe delivery by the natural passages is greater than that of a well-performed Cæsarean section with the woman in good condition and a uterus uninfected.

In a case in which forceps delivery has already been tried and failed, or where the patient has been subjected to much manipulation, or where the mother's condition or that of her child is unfavourable, or where the necessary assistance and appliances are not forthcoming, the operation of Cæsarean section is contra-indicated, and it would be in almost all cases advisable to proceed at once with perforation of the head.

Perforation of the Head.—Perforation of the head is indicated in labour obstructed by a large flat pelvis under the following conditions :

1. As a primary measure, where the child is dead, or where though alive the disparity between the head and the brim is so great that there is no practical hope of a live delivery, either by forceps or version, and where by reason of the condition of the mother or child, or the want of the necessary skill, assistance, or appliances, delivery by Cæsarean section or division of the pelvis is undesirable or impracticable.

2. As a secondary measure after forceps traction or version have failed to effect delivery.

Destruction of the child is admittedly a distasteful operation, and in a lying-in hospital it has rarely to be resorted to.

Under the circumstances of private practice, however, there is no doubt that it forms a ready and justifiable resort for the medical man in cases of difficulty, and where he has to choose between it and an attempt at delivery by forceps or version in which great difficulty can with certainty be anticipated, he should choose the former.

The birth of a dead, or moribund, though intact child at the cost of severe bruising or laceration of the maternal passages is a poor result to balance against the very considerable mortality and morbidity risks which such a labour involves.

Where forceps traction has failed, perforation or division of the pelvis are the alternatives, and in most cases the former is the best course (see next section).

Where after version the head cannot be delivered by reasonable effort, or the cord ceases to pulsate, perforation should at once be performed.

Division of the Pelvis.—The operations of symphysiotomy and pubiotomy, especially the latter, have been extensively practised on the Continent, and to a less extent by certain British and American authorities.

The technique of their performance is described on p. 651. Pubiotomy is undoubtedly the better of the two.

The maternal mortality of pubiotomy may be reckoned as about 2 per cent., and that in the children as about 4 per cent., when the operation is carried out by expert hands under favourable circumstances and on properly selected cases.

Both proceedings demand expert technical skill on the part of the operator, efficient assistance, and all the circumstances of surgical asepsis.

They are, therefore, best fitted for the theatre of a lying-in hospital, and for cases in private in which these *desiderata* are obtainable. They are not suited to the very disadvantageous circumstances under which much work in private practice has to be carried out.

Both operations have a considerable morbidity rate, the puerperium being pyrexial in many of the cases. This is chiefly due to the occurrence of lacerations extending from the vagina to the site of the section of the bone, and sometimes involving the urethra or bladder.

The late results are good. Union is fibrous in most cases, and leaves a degree of permanent enlargement of the pelvis and a potentiality of stretching which has in a good many cases allowed subsequent labours to be effected by nature unaided, whilst no disability as regards walking appears to occur.

The gain to the conjugate diameter obtained by the operation is half an inch or a little over, but there is as well a general increase in all the dimensions of the pelvis.

Though both symphysiotomy and pubiotomy have been recommended in contraction with a true conjugate as low as $2\frac{3}{4}$ inches (7 centimetres), we are of opinion that they should in cases of flat pelvis be reserved for those in which the conjugate is not less than $3\frac{1}{4}$ inches, and only then when the disparity between the head and the pelvis is not so great but that the former has made some attempt to enter the brim.

Further, they should not be performed unless the cervix is at least three-quarters dilated in a primipara, or two-thirds dilated in a multipara.

They are ideally indicated when forceps traction having failed to deliver, it is reasonably certain that the additional room given by the division will allow the head to pass, the condition of the mother and child meanwhile being satisfactory.

Of the two operations pubiotomy is the better, the bladder and urethra are in less danger of being torn or wounded, but division of the symphysis has this advantage, that it can be performed without any special apparatus.

Division of the pelvis as applied to a large flat pelvis may, therefore, be considered under the following heads:

As an Alternative to Cæsarean Section as a Primary Method of Delivery. The circumstances under which Cæsarean section is indicated with a large flat pelvis have been already indicated.

We are of opinion that where in a case reasonably to be deemed uninfected, the head seems quite unable to enter the brim, Cæsarean section is the quickest, most humane and the best method of delivery, assuming that the child is alive and the mother in good condition.

On the other hand, in probably infected cases in which the head had made some attempt to enter the brim, or in those instances in which the patient, or her husband, objects to an abdominal operation, division of the pelvis may be advised as an alternative to perforation.

During and after the division the patient should be placed in Walcher's position, and time should be given for the head to come

down and dilate the cervix, if this is necessary, otherwise forceps should be immediately employed and the head carefully extracted.

As a Resort after Forceps Traction.—In our opinion this is the best manner in which to employ division of the pelvis. That it should be successful, it is essential that all indications for the application of forceps should be properly observed, see p. 390, and also that it should be carried out directly it is apparent that the head is not likely to be pulled through the brim.

Before applying the forceps in a case in which division of the pelvis will probably be necessary, it has been advised that the saw should already be placed in position, so that the operation may be carried out directly it is certain that the head will not come through. This practice appears sound.

Division of the Pelvis where the Head is presented abnormally.—If in addition to the flattening of the pelvis the head is presenting abnormally, division of the pelvis is contra-indicated unless the head can be manipulated beforehand into a good position. This is especially the case in a first labour, for if the head be pulled down by forceps in its faulty position, severe laceration of the soft parts is rendered very likely.

Division of the Pelvis and Breech Delivery.—Under the circumstances mentioned above version has been performed after division of the pelvis. We are of opinion that if by reason of faulty head presentation, or shoulder, or pelvic presentation, delivery by the breech is rendered expedient, or is necessitated, division of the pelvis is contra-indicated, because of the largely increased chance that the child will be born dead in spite of the operation.

Conclusions.—Division of the pelvis is a proceeding having the great advantage over Cæsarean section that it can be carried out in cases where by reason of probable infection the latter is contra-indicated. It is, however, in our opinion, unwise to perform it unless it is reasonably certain that after the division the delivery prove easy. Moderate obstruction to a well-presenting head, the soft passages being capacious, may be taken as the general indication: great obstruction, or a badly presenting head and a narrow soft passage, as the general contra-indication.

2. The Small Flat Pelvis. True Conjugate $2\frac{1}{4}$ to $3\frac{1}{4}$ Inches.

In a flat pelvis with a conjugate diameter under $3\frac{1}{4}$ inches, it may be taken practically that delivery of a surviving child by the natural passages is impossible.

It is true that occasionally even full-term children are expelled through such a pelvis by the uterus unaided, and that by induction at the thirtieth and twenty-eighth week the difficulty of obstruction in pelves with a true conjugate of 3 and $2\frac{3}{4}$ inches respectively can be obviated, but it is definitely shown that a child of greater prematurity than the thirty-second week is most unlikely to ultimately survive.

Thus the question of the methods of dealing with childbirth complicated by a small flat pelvis is much simpler than in the case of the large flat pelvis, and resolves itself into a choice between Cæsarean section and a destructive operation on the child.

Cæsarean Section.—Where the fact of the pelvic contraction is known before labour, Cæsarean section should be advised.

The operation when thus decided on and prepared for beforehand and performed at the time of election is associated with no ordinary risk that is not preventable.

The operative mortality of such cases is probably not above 2 per cent. Opinions are divided as to whether it is better to perform the operation at term without awaiting labour, or to postpone it until uterine contractions begin.

The first course has the advantage that the preparations and arrangements can be deliberately proceeded with in accordance with the time fixed; the second may necessitate a somewhat hurried marshalling of the surgeon's forces, but has the theoretical advantage that he deals with a uterus in full contraction, and less likely to bleed seriously. The first course is that usually chosen in institutional practice. Where the pelvic contraction is only discovered when the patient is in labour, the propriety of performing Cæsarean section is governed by four factors:

1. The question of uterine infection.
2. The condition of the child.
3. The skill and means at the practitioner's disposal.
4. The risks of the alternative proceeding, namely, destruction of the child.

Uterine Infection.—By far the most important point determining the obstetrician's action is the question of an infected condition of the uterus. It may be premised at the outset that if the case is seen before the membranes are ruptured the uterus is sterile and the case a proper one for the abdominal operation.

After the membranes have given way the liability to uterine infection increases directly with the length of time they have been ruptured, the amount of pressure on the soft parts, and the extent to which manipulations per vaginam have been indulged in, and

the care and the degree of asepsis with which they have been carried out.

Thus each case must be judged on its own merits.

In some the signs of infection are obvious, such as fever, rapid pulse, and foul uterine discharge. Œdema of the soft parts, especially the cervix, more particularly if the tissues are bluish-black, dry and very tender, indicates severe pressure, and the likelihood of autogenous infection later on, even if infection be not already present, see p. 484.

In such cases Cæsarean section is contra-indicated.

There are others, however, the "suspect" cases of Armand Routh, in which the suspicion of infection rests not upon the actual gross findings, but upon the history of prolonged labour subsequent to the rupture of the membranes, and abortive attempts to deliver by forceps traction or otherwise. Routh has suggested the possibility of determining the bacterial condition of the uterus in these cases by an immediate smear preparation made from the liquor amnii in the uterus, but it is a method not often practicable even if its results were reliable.

It may be taken that if the hand has been passed through the vagina into the uterus, the latter has been infected. Whether such infection is virulent must be judged by the surgeon on common-sense grounds. Much manipulation may be carried out by a careful practitioner with gloved hands without seriously infecting a healthy patient; while on the other hand, an ignorant, dirty attendant may implant the most virulent micro-organisms by a single examination.

If in such "suspect" cases the abdominal operation is decided upon, the vagina should first be thoroughly washed out with a large quantity of some antiseptic solution, or Maxwell's plan of intra-amniotic irrigation may be carried out.

Condition of the Child.—Death or a moribund condition of the child contra-indicates the abdominal operation.

Skill of the Practitioner.—Classical Cæsarean section is not a difficult operation to one who knows the technique, but it requires at least two assistants, one to administer the anæsthetic and one to assist the surgeon. A scapel, a pair of scissors, a few artery forceps, some stout ligature material, a few swabs, and a firm table, are all the appliances required.

On the other hand, should the occasion demand the removal of the uterus after the delivery of the child, a higher degree of technical skill will be required.

Extra-peritoneal Cæsarean section should only be carried out by those expert in obstetric surgery.

Risk as compared with Destruction of the Child.—As regards the risk of a destructive operation on the child, it may be stated that in a flat pelvis of the size with which we are now dealing (true conjugate $2\frac{1}{4}$ to $3\frac{1}{4}$ inches) delivery by a destructive operation should not as a rule be accompanied with great risk. With a conjugate of the lower limit, however, and a child above the average size, extraction, even after perforation and cranioclasm, may be a very difficult proceeding, involving a risk as great, or greater, than Cæsarean section under circumstances of suspected infection.

This is still more so where such a case is complicated by a transverse or oblique lie of the child, a cervix only very partially dilated, and a rigid condition of the uterine muscle. In such decapitation at least would be necessary, and it might be impossible to deliver through the vagina. Under such circumstances the obstetrician anticipating the difficulties of delivery by the natural route may properly select the abdominal operation as the lesser of two evils, even though the uterus be "suspect" or the child dead.

The details of the technique of Cæsarean section are described on p. 662.

In a case of probable infection the removal of the child should be followed by hysterectomy, to obviate peritonitis, which is the chief post-operative danger. The extra-peritoneal operation described on p. 683 was designed for the same end. It is a considerably more difficult proceeding, and in our opinion is inferior to trans-peritoneal Cæsarean section.

Craniotomy and Embryotomy.—Destruction of the child is the alternative to Cæsarean section in labour obstructed by a small flat pelvis.

It is indicated if the uterus is almost certainly infected, if the child is dead or moribund, or if the obstetrician lacks the necessary skill, appliances or assistance which the abdominal operation demands.

A large proportion of the cases requiring a destructive operation on the child are those in which the gravity of the situation has been overlooked and the more marked signs of obstructed labour with tonic contraction of the uterus have manifested themselves.

In such immediate delivery is called for, which is best carried out by perforation of the head, followed by cranioclasm or cephalotripsy, see p. 621.

If the breech presents, a leg should be brought down, and the after-coming head perforated.

If the fœtus is lying obliquely with the shoulder presenting, decapitation or embryotomy is the proper course.

Delivery by cranioclasm or cephalotripsy in pelves of the size with which we are now dealing is usually not difficult, but with a conjugate of the lower limit ($2\frac{1}{4}$ inches) and an exceptionally big child it may be otherwise.

Embryotomy, always a more difficult proceeding, may, under like circumstances, be a very formidable operation.

Thus cases are occasionally met with in which, though delivery through the vagina is feasible, yet it is accompanied by a risk greater than that of Cæsarean section.

In such an event abdominal delivery might be rightly selected, even though the child was dead and the uterus probably infected. Finally, it may be remarked that several cases are on record in which delivery was impossible, though the head had been perforated and largely broken up. In such a rare event Cæsarean section would be the only course left. A case of this kind operated upon by one of us recovered satisfactorily.

The technique of the destructive operations mentioned is described on pp. 621 to 650.

3. The Very Small Flat Pelvis. True Conjugate under $2\frac{1}{4}$ Inches.

Flattening of the pelvis to such a degree that the available true conjugate diameter is reduced to less than $2\frac{1}{4}$ inches is chiefly seen in osteo-malacia, but exceptionally it is a result of extreme rickets. The pelvic brim is tri-radiate, the pelvis "beaked," and in the osteo-malacosteon pelvis particularly the cavity and outlet measurements are also much reduced.

Through a pelvis of such reduced dimensions it is impracticable to get a viable child even by embryotomy. The treatment of pregnancy and labour complicated with such a pelvis is therefore an abdominal operation.

As a large proportion of the patients are the subjects of osteo-malacia, removal of the pregnant uterus with the ovaries before viability may be called for, see p. 316.

In other cases where the necessity for arresting the disease before viability does not obtain, Cæsarean hysterectomy with removal of the ovaries is the proper course. If the pelvic deformity be due to rickets, conservative Cæsarean section at term is indicated, unless spinal deformity necessitates an earlier emptying of the uterus, see p. 318.

In labour abdominal delivery is the only possible course.

In a clean case this should be effected by trans-peritoneal Cæsarean section, with conservation or removal of the ovaries as the case may demand.

In an infected or "suspect" case Cæsarean hysterectomy and oöphorectomy is the only course if the patient be osteo-malacic, but in a rickety case extra-peritoneal Cæsarean section would be an alternative.

PELVES IN WHICH THE CONTRACTION AFFECTS THE CAVITY AND OUTLET.

Although in the more extreme degrees of flattened pelvis the cavity is also reduced in size, yet it is an unimportant feature. In the pelves now to be considered the contraction principally affects the cavity and outlet, and in this group we place:

The generally contracted pelvis.
The funnel-shaped pelvis.
Naegele's pelvis.
Robert's pelvis.
The pelvis due to unilated hip-joint disease.
The kyphotic and kypho-scoliotic pelvis.
The split pelvis.
The pelvis in which the cavity is encroached upon by tumours springing from its bony wall.
The pelvis complicated with bilateral anchylosis of the hip-joint. This last for convenience.

All these types of pelvic deformity are uncommon, and it is not within the scope of this work to minutely consider their characteristics, nor the mechanism by which the deformities were brought about, but a brief description of each is necessary.

The Generally Contracted Pelvis.—In this type either all the diameters are contracted, but their relation one to another remains the same (as in *the dwarf pelvis*), or all the measurements being below normal the transverse diameters, more especially those of the cavity and outlet, are more contracted than the rest (*the small round pelvis*).

The small perfectly proportioned pelvis is typically seen in congenital dwarfism and rarely gives rise to difficulty, since if such individuals become pregnant the fœtus is, as a rule, proportionally small. The small round pelvis, on the other hand, may be met with in persons of average height and appearance, in whom the only indication of the deformity may be a suspicious narrowness of the hips.

The pelvis is rounder than normal and the promontory of the sacrum unusually high, so that the difference between the diagonal and true conjugates is as much as an inch. The size of the cavity

is much under the normal, and the contraction increases from above downwards (Fig. 122).

In extreme cases the transverse diameter of the outlet may be as small as 3 inches.

The Funnel-shaped Pelvis.—The type closely approximates to the small round pelvis. It resembles the last-named in that the cavity diminishes in size from above downwards, but it differs from it in that the pelvis as a whole is not a small one, while the bony development is greater than that normally met with in women.

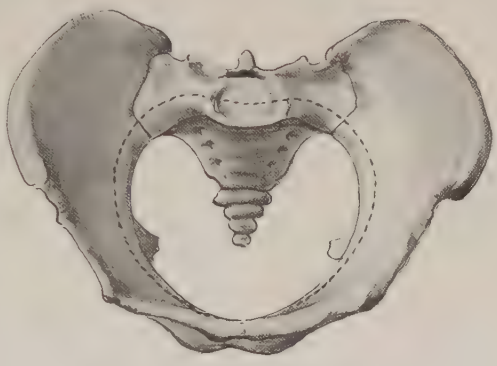


FIG. 122.—Small Round Pelvis.

Naegele's Pelvis.—In this rare pelvis there exists an asymmetrical narrowing of the cavity, owing to want of development and premature fusion of the ala of the sacrum to the ilium on one side (Fig. 123).

Robert's Pelvis.—In this pelvis the deformity just described is bilateral, and the pelvis, though symmetrical, is greatly narrowed from side to side (Fig. 124).

The Pelvis of Hip-joint Disease.—Tubercular diseases of the hip-joint, by shortening the leg on that side and bringing it closer to the middle line of the body, produce a want of lateral expansion of the pelvis on that side. The symphysis pubis is pulled towards the healthy side, and an asymmetrical and slightly contracted condition of the cavity results. It is rarely sufficient, however, to give rise to obstruction in labour.

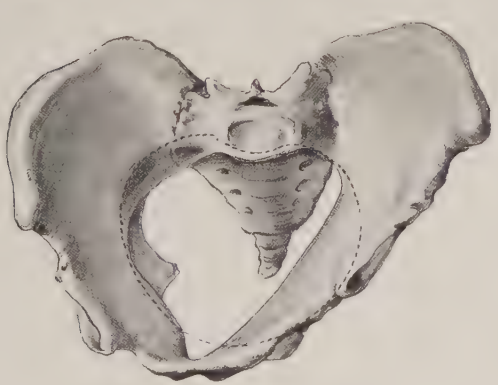


FIG. 123.—Naegele's Pelvis.

The Pelvis of Disease of the Sacro-iliac and Sacro-coccygeal Joints.—If as a result of caries of the sacro-ilac joint ankylosis occurs, the development of the ala of the sacrum implicated may be arrested. The pelvis then becomes obliquely

contracted and the deformity approximates that of the Naegele pelvis.

Ankylosis of the saccro-coccygeal joint may delay the advance of the child's head by narrowing the diameter of the outlet.

The Kyphotic and Kypho-scoliotic Pelvis.—Kyphosis, when it affects the lower part of the spine, is compensated for by a backward tilting of the pelvis, whereby the sacral promontory is pushed downwards and backwards, while the lower part of the sacrum and coccyx are rotated forwards (Fig. 125).

FIG. 124.—Robert's Pelvis.

The result is an elongation of the pelvic brim from before backwards, and a diminution of the measurements of the outlet, especially in its antero-posterior diameter.

The degree to which deformity obstructs labour varies in different cases. The aspect of the spinal deformity in relation to pregnancy is discussed on p. 318.

Where scoliosis is present as well as kyphosis, the deformity due to the latter is complicated by a degree of asymmetry caused by the body weight falling to one side of the mid-line of the body. Many of these individuals are also rickety, so that a form of pelvis is produced embodying a combination of all three types.

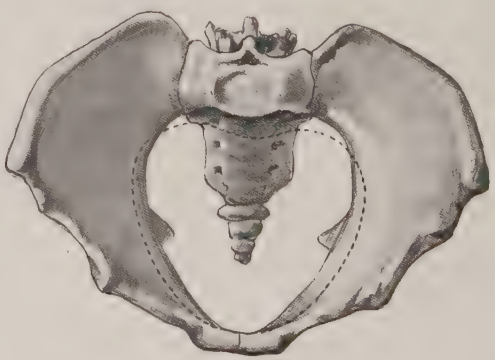


FIG. 125.—Kyphotic Pelvis.

The Split Pelvis.—The subject of ectopia vesicæ as a complication of pregnancy and labour has been dealt with, p. 72.

The pelvis associated with the condition is deficient in front.

As a result of the absence of the symphysis pubis, the sacrum sinks forwards between the ilia and materially reduces the pelvic capacity. In consequence, however, of the gap in front the

deformity does not appear to have been productive of obstruction in labour (Fig. 126).

Pelves encroached upon by Tumours of the Bone Projecting into the Cavity.—No general discussion of these is possible. The bony projection may be an osteoma, chondroma, osteo-sarcoma, or the result of fracture of the floor of the acetabulum, with in-driving of the head of the femur (Fig. 127).

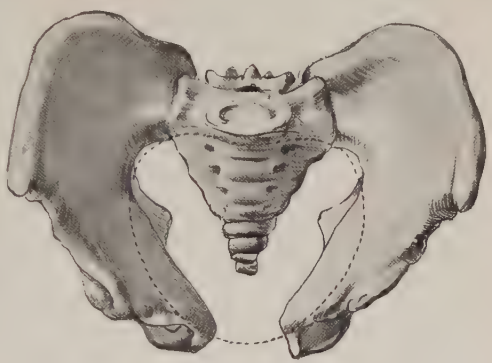


Fig. 126.—Split Pelvis.

Anchylosis of both Hip-joints. — Anchylosis of both hip-joints may be associated with a degree of narrowing of the pelvis (see the Pelvis of Hip-joint Disease). The most important aspect of the deformity, however, is the obstruction to delivery in consequence of the fixed position of the legs.

THE EFFECT OF A PELVIS CONTRACTED IN THE CAVITY AND OUTLET.

Many of the types of contracted pelvis just dealt with are so rare that no general rules are possible in regard to their effect on labour. In such, each case must be considered on its own merits.

In the commoner kinds of generally contracted pelvis, namely the small round pelvis and the funnel-shaped pelvis, the head or breech usually presents. In the former event flexion is extreme. The membranes are preserved intact for an undue length of time, because the presenting part so closely fits the pelvic brim. The obstruction increases as the child descends, and arrest usually takes place low down.

In such cases the uterus forms the whole of the upper segment, the retraction ring being situated at the cervico-vaginal junction. If rupture of the canal occurs, it most commonly affects the posterior part of the vaginal fornix, the uterus, so to speak, tearing itself away from the vaginal wall.

The head is subjected to excessive moulding, and the child may fail to survive. In the oblique or transversely contracted pelves, the head tends to enter the pelvis with its antero-posterior diameter in the largest available diameter of the brim.

DIAGNOSIS.

Where the pelvic abnormality is associated with gross bodily deformity, as in the case of spinal or hip-joint disease, attention is early drawn to its possibility.

Much more difficult are those cases of general pelvic contraction occurring in an individual apparently well formed. In such, the

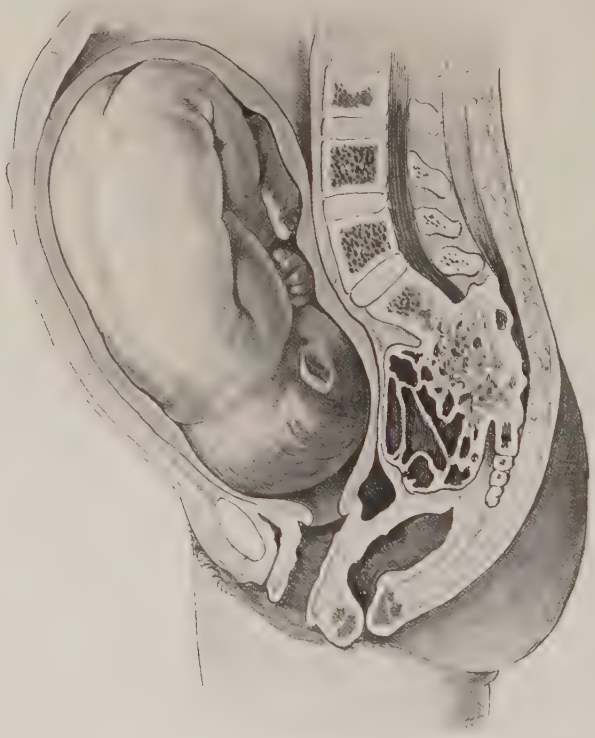


Fig. 127.—Tumour of the Sacrum obstructing Delivery.

condition of the pelvis is, as a rule, not discovered until the patient is in labour.

The diagnosis is established by measurement. It is important to remember that in the small round and funnel-shaped pelves, estimation of the true conjugate is of much less value than in the case of a flat pelvis. Moreover, owing to the height at which the sacral promontory lies, it may be impossible to reach that point by ordinary digital examination, even with a considerable degree

of contraction. At least an inch should be subtracted from the diagonal conjugate when estimating the true conjugate.

Of much more importance is the careful measurement of the diameters of the outlet and a general estimation of the capacity of the pelvis by thorough digital exploration, aided by a pelvimeter and carried out, if necessary, under an anæsthetic.

TREATMENT.

The management of pregnancy and labour with a generally contracted pelvis is more difficult to decide on than in the case of a flat pelvis.

The difficulties are more formidable, because obstruction is encountered throughout the cavity of the pelvis instead of at the upper part only, and because in a large proportion of cases the fact of the pelvis being abnormally small is not discovered until labour is well advanced.

In the rarer types of general contraction no one observer has seen a sufficient number to acquire great experience, and such cases must be treated more on common-sense lines than on any hard-and-fast rule. The following remarks apply chiefly to the commoner types of general contraction, namely, the small round and the funnel-shaped pelvis.

Induction of Labour.—Induction of labour is less likely to be successful in a generally contracted than in a flat pelvis, because of the greater difficulty of determining the date at which it should be carried out.

It is, however, to be advised if the degree of contraction does not appear to be such that it will be necessary to terminate the pregnancy before the thirty-fourth week, and if the attempt to obtain a living child by these means has not been tried before and been unsuccessful.

In applying the "rule of weeks" described on p. 394, the times for induction should be antedated at least a fortnight.

Estimation of the relative size of the head and the pelvis by Kerr's method is much more difficult than in the case of a flat pelvis, because the head is well above the narrowest strait of the pelvis, and cannot be pushed into it.

Careful measurement of the fœtal head by MacDonald's method, coupled with the use of Skutsch's pelvimeter to ascertain the capacity of the pelvis, is probably the best way of making out the relation borne by the child's head to the maternal pelvis, but the result should be checked by all the other means at the practitioner's command.

Since the patients in whom induction of labour is indicated have in most instances already had one child, the past obstetric history may assist the decision. This is particularly the case if induction has already been tried and failed to secure a living child. The general tendency with a generally contracted pelvis is to delay the induction too long.

Forceps.—Forceps traction is the first resort of the practitioner in those cases in which the discovery of a small round or funnel-shaped pelvis is not made until the patient is well advanced in labour.

As has been said, the head, if presenting, is generally well flexed, while premature rupture of the membranes is uncommon, and both these conditions are very favourable to the application of forceps. Considerable and prolonged traction is usually required, and both the soft parts and the fœtal head are severely pressed upon, so that there is a risk of vesico-vaginal fistula if the pressure be maintained too long, while a large proportion of the children are born in a condition of white asphyxia. If delivery by forceps fails, two courses are open, either to perforate the head or to perform division of the pelvis. Version is a most improper proceeding.

Perforation of the Head.—Perforation of the head should be performed in all cases in which forceps traction has failed to deliver, and in which for any reason division of the pelvis is contra-indicated. The pressure exercised on the head in these cases is always severe, and it is undesirable to operate further on the mother unless there is a reasonable chance of the child being born alive.

Division of the Pelvis.—Of all types the small round and the funnel-shaped pelves are best suited for division of the pelvis, because the operation effects a general enlargement of the cavity. Moreover, in them the fact of the deformity is commonly not discovered until the second stage is well established, that is to say, at a period when the time of election for Cæsarean section has passed.

The question of the advisability of performing symphysiotomy or pubiotomy will depend upon the circumstances of the case. Where expert aid can be commanded, where the child and mother are in satisfactory condition, and where a tentative attempt at forceps traction shows that delivery could be easily effected if the pelvis was somewhat enlarged, one of these operations, preferably pubiotomy, should be carried out.

In the reverse of these conditions the practitioner should perforate the head.

The rarer types of general contraction are all of them unsuitable for division of the pelvis, particularly those in which anchylosis of the sacro-iliac joint or joints is present.

Cæsarean Section.—In the small round and funnel-shaped types of pelvis Cæsarean section is chiefly performed under circumstances of deliberate pre-arrangement, based on the history of difficulty in past labours, not infrequently in spite of induction. Where induction has been tried and failed, the choice rests between a repetition of this proceeding at an earlier date, Cæsarean section at the time of election, or division of the pelvis in labour.

It is useless inducing labour before the thirty-second week. In our opinion, pubiotomy is best suited to those cases in which the labour has already reached the second stage by the time the obstruction is appreciated.

Where the practitioner has to decide during pregnancy, the best course to be pursued is, we think, Cæsarean section, supposing induction has already been tried and has failed.

Supposing the fact of the contraction is discovered during the first stage, it will be necessary to decide between leaving labour to proceed, and subsequently attempting to deliver with forceps, supplemented by division of the pelvis if need be, and Cæsarean section.

If the labour be a first one, and the head presenting with no extreme disparity between it and the pelvis, we believe the first course to be the proper one.

If, however, there is a history of previous severe obstruction to delivery, or if the disparity between the head and pelvis is very marked, or if the breech is presenting, we favour the second course.

When labour has advanced to the second stage, Cæsarean section is not, as a rule, indicated.

In the rarer types of generally contracted pelvis, Cæsarean section is more constantly the operation of election, because to them symphysiotomy or pubiotomy are not applicable. In some, such as those complicated by bony outgrowths or anchylosis of both hip-joints, it may be the only possible proceeding.

Version.—Version is totally contra-indicated in the commoner types of general contraction, namely, the small round and funnel-shaped pelves.

In some of the rarer oblique pelves it has been stated that an after-coming head passes through more easily than one fore-coming.

If the sacro-coccygeal joint is ankylosed and obstructs the advance of the child's head the best treatment is to remove the coccyx.

CHAPTER XXIII.

Labour Complicated by Abnormalities of the Child and Umbilical Cord:

ABNORMAL SIZE OF THE CHILD.

CAUSE.

The size of the child depends upon heredity, the length of pregnancy, the physique of the parents, the age of the mother, the state of nutrition of the mother, the number of the pregnancy, and the sex of the child.

Heredity.—It is a matter of common knowledge that in certain races and families the members thereof have been above the normal size for generations.

Prolonged Pregnancy.—It has been shown that when gestation is prolonged beyond the fortieth week, the labour is apt to be difficult, owing to abnormal size of the child and excessive ossification of the bones of its skull. Further, it is known that many of these post-mature children die *in utero* before labour begins.

Physique of the Parents.—Exceptionally large women may habitually produce children of exceptional weight without any difficulty in labour. The relation borne by the size of the father to the size of the fœtus is not determined, but, on the whole, it may be regarded as negligible, a point of importance in the case of a very large man married, as is so often the case, to a small woman.

Age of the Mother.—The size of the child bears a certain relation to the age of the mother, the weight increasing up to thirty years of age.

State of Nutrition.—A well-nourished woman bears heavier children than one badly nourished.

Number of the Pregnancy.—The size of the children tends to increase with successive births, and weights up to 10 lb. are not unusual. Above this weight the lower limit of abnormality is entered upon.

Sex of the Child.—Males are larger than females as a rule.

No Cause Apparent.—Finally, in certain rare instances the child may be of enormous size without any apparent cause, and weights up to 20 lb. have been recorded. As a rule these heavy children are stillborn, but a living child weighing close upon 19 lb. has been delivered by forceps.

SIGNS AND RESULTS.

Abnormal size of the child is, as a rule, only discovered during labour. If the head presents, and it fails to descend in spite of full dilatation of the cervix, strong pains and a normal pelvis and presentation, abnormal size may be suspected. If the mother is correspondingly large, and her pelvis especially is roomy, no particular difficulty may be met with. On the other hand, gigantism is an occasional cause of serious obstruction in labour. Children of excessive size are often born dead, or die suddenly soon after delivery.

TREATMENT.

The action of the obstetrician will depend upon his estimate of the relative size of the head and the pelvis. This can best be tested by Munro Kerr's method, the patient being under an anæsthetic, or by introducing the whole hand into the uterus.

If the disparity is great and there is obviously no chance of the head entering the pelvis, the best treatment is Cæsarean section, if the mother and child are in good condition.

If the deformity is not so great and there seems a chance of delivering a living child *per vias naturales*, forceps traction should be carefully tried; if this fails and there is no contra-indication, Cæsarean section may be performed, otherwise the head will have to be perforated.

The difficulty of delivery is not over, however, when the head is born, for in many of these cases the principal difficulty has been the extraction of the shoulders, and to accomplish this we have had to perform cleidotomy.

In a breech presentation the large size of the child's legs will be at once apparent. The trunk and limbs can usually be delivered by careful manipulation, see p. 337, but if difficulty is experienced with the head, it should at once be perforated.

The abnormal prolongation of pregnancy is often difficult to prove. In undoubted cases labour seems to be delayed till the forty-fourth week. Where it is reasonably certain that a woman is over "term," labour should be induced in the interests of both mother and child.

HYDROCEPHALUS.

A hydrocephalic fœtus presents by the head or breech, more commonly by the head, but the frequency of breech presentation is much above the average in these cases.

DIAGNOSIS.

Head Presenting.—On abdominal examination the head will not have entered the brim and will be movable. The lower segment of the uterus is obviously larger than normal. On vaginal examination the head is not easily palpated, or if it can be palpated, then it appears to be much flatter than usual, the sutures are much wider, the fontanelles much larger, and the sharp edges of the

FIG. 128.—Hydrocephalus.

separated bones are easily identified. As a rule the bones are soft. The head on bimanual examination is felt as a cystic mass (Fig. 128).

If there is any difficulty in the diagnosis, it can be cleared up by the introduction of the hand under an anæsthetic, and the small face and protruding forehead will be specially noted.

The head has been mistaken for a bag of membranes.

Breech Presenting. — The diagnosis of hydrocephalus with breech presentation is a more difficult matter. It will be noticed

that when the body of the child is born the uterus is still markedly distended, and the birth of the head will be delayed. On passing the hand up to find the cause of delay or to assist delivery, the condition should be diagnosed.

PROGNOSIS.

The prognosis depends upon when the condition is recognised. If it is recognised early and treated efficiently, the condition presents no particular dangers.

Because, however, it is sometimes not recognised till late, and then perhaps only after ineffectual and prolonged efforts at delivery have been attempted, the prognosis to the mother is worse than it should be, and it is computed that, taking one case with another, the mortality is somewhere between 12 and 18 per cent., most of the fatal cases being due to rupture of the uterus.

The child is generally killed during delivery; those that are born alive die very soon. With a slight degree of the abnormality the child may survive, but will grow up an idiot.

TREATMENT.

Head Presenting.—The head must immediately be perforated, and, if necessary, subsequently extracted by the cranioclast. As the fœtus with the exception of its head is usually small, delivery is easily effected.

Breech Presenting. — The after-coming head is, of course, arrested above the brim. In most cases it can be reached and perforated after the arms have been brought down, and then delivered by traction. If this is impossible, the spine of the fœtus should be divided by a transverse incision, so as to open the theca of the cord and allow of the escape of the meningeal fluid if the hydrocephalus be of the variety termed "external." If the head cannot be tapped in this way because the fluid is loculated in the cerebral ventricles, a catheter can be passed up the spinal canal, pushed into the brain and the fluid thus drawn off, or the obstructing trunk should be removed by severing the neck with scissors, after which access to the head for the purpose of perforation will not be difficult.

Preparation should be made beforehand for the treatment of post-partum hæmorrhage, the uterus being apt to be atonic.

GENERAL DROPSY.

CAUSE.

The cause of this condition is not known. In some cases the mother is dropsical.

RESULTS.

Abnormal presentations are very common. Delivery may be effected spontaneously, or various operative procedures may be necessary to deliver the child.

The placenta is often large and œdematous, and if so, the third stage of labour may be difficult.

The fœtal tissues are often very friable, and the practitioner may first become aware of the condition by the fact that traction on the head or limbs leads to their evulsion. This accident should suggest the real state of affairs.

TREATMENT.

Traction may have to be applied, in which case the limbs and head may separate, and the child will have to be delivered piecemeal. If further delay occurs evisceration should be performed, when, as a rule, the child will be easily delivered.

MENINGOCELE AND MENINGO-ENCEPHALOCELE.

These present as soft tumours projecting from the head of the fœtus. They vary in size, being at times larger than the head, the sac, even when the fluid is evacuted, reaching as low as the sacrum.

RESULT.

They rarely give rise to serious obstruction on account of their plastic nature.

Sometimes in cases of breech presentation, when traction has been made on the child to deliver it, the cyst has burst.

DIAGNOSIS.

The tumour has been mistaken for a second bag of membranes.

TREATMENT.

If any obstruction results, the cystic swelling should be incised or punctured, so as to allow the cerebrospinal fluid to escape and the sac to collapse.

TUMOURS OF THE NECK AND THORAX.

Enlarged Thyroid.

Congenital enlargement of the thyroid gland prevents flexion of the head during the second stage of labour, and causes face presentation. In this regard it may delay delivery.

Rarely it may cause an obstruction to labour, and it may so press on the trachea as to asphyxiate the child after delivery.

TREATMENT.

If obstruction is caused, the head must be perforated and the tumour cut away with scissors if necessary.

Lymphangioma.

Cystic lymphangioma is sometimes met with on one or both sides of the neck. At times it extends down into the axilla and thorax.

TREATMENT.

When diagnosed it should be immediately punctured. The child may be lying in an oblique position, in which case it may have to be decapitated.

HYDROTHORAX.

Distension of the thorax is a very rare event, and is seldom present apart from ascites.

RESULT.

As the shoulders will not be able to enter the pelvis, labour will be delayed.

DIAGNOSIS.

The diagnosis will only be made when the expulsion of the child ceases after the head is born. A detailed examination with the hand in the uterus will then disclose the cause of the delay.

TREATMENT.

The thorax must be perforated so that the fluid may escape.

DISTENSION OF THE ABDOMEN.

CAUSE.

The abdomen may be distended by ascites, or by tumours of the liver, kidney, spleen, or ovaries, or by distension of the bladder from imperforate urethra (Fig. 129).

RESULT.

The result will naturally depend upon the size and consistency of the swelling. If small and soft, the child may be born. Generally an obstruction results. In one remarkable case of hydronephrosis we met with the child was born alive, and a day later the tumour

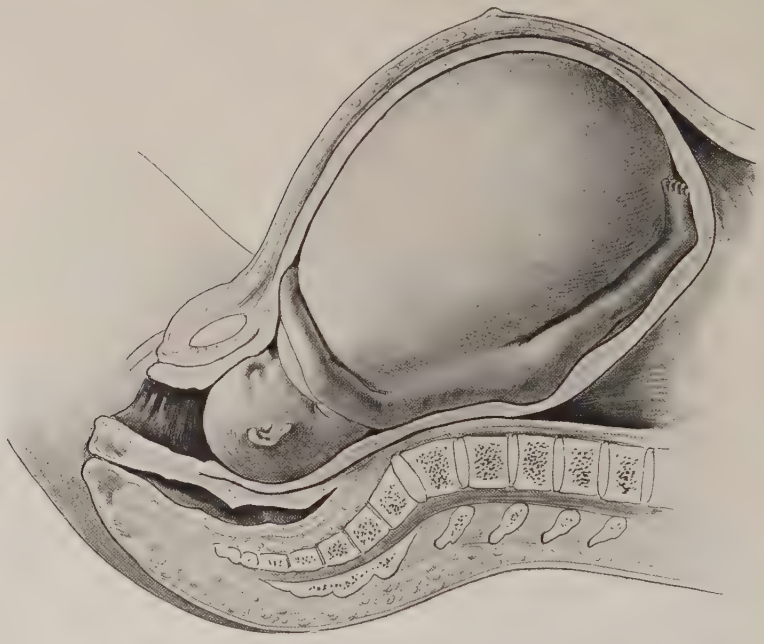


FIG. 129.—Distended Fœtal Abdomen obstructing Delivery.

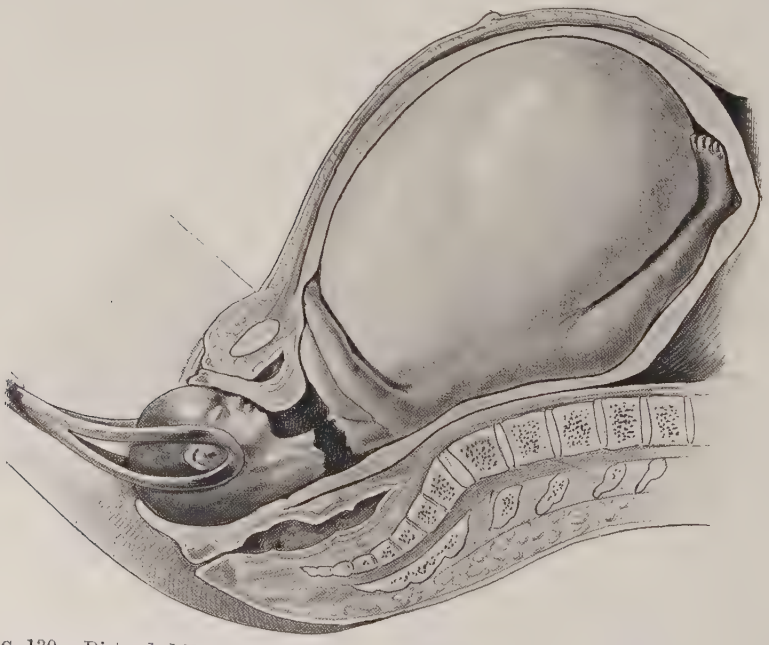


FIG. 130.—Distended Fœtal Abdomen. Separation of the Head on Forceps Traction.

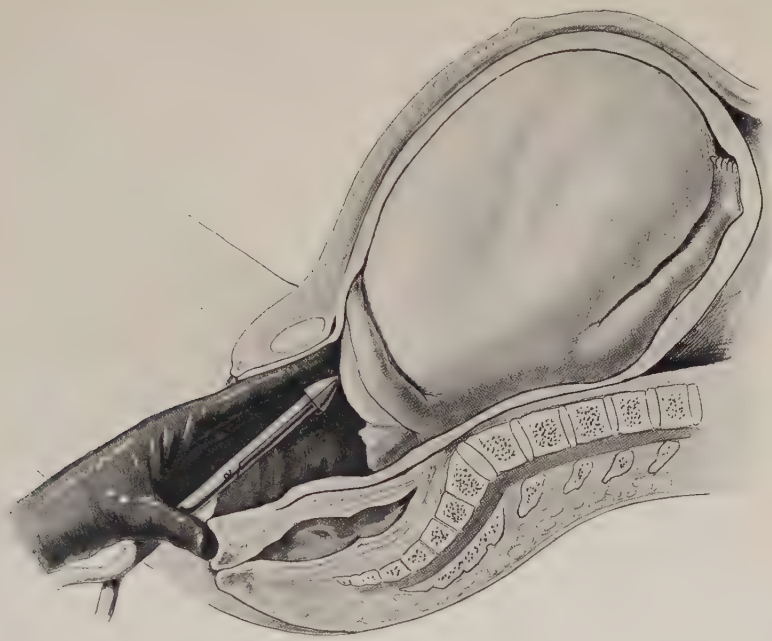


FIG. 131.—Perforating the Distended Fœtal Abdomen.

FIG. 132.—Removal of the Body after Perforation of the Distended Fœtal Abdomen.

was removed by nephrectomy. The child lived for some time afterwards.

DIAGNOSIS.

The condition is discovered in a vertex presentation only after the head is born, and delay necessitates an intra-uterine examination, or in a breech presentation for the same reason after the birth of the legs.

In all these conditions a characteristic phenomenon may occur, namely, that the head or legs (according to the presentation) are pulled off by the accoucheur in his efforts to deliver the child (Fig. 130). Such evulsion under these circumstances is not blameworthy, because, especially when the head presents, there is no means of recognising the state of the abdomen above. Its occurrence, however, should immediately inform the operator as to the nature of the obstruction.

TREATMENT.

If the swelling is cystic, it should be perforated immediately (Fig. 131). The fluid having been evacuated, the collapsed trunk, which is almost always a small one, should be delivered by traction on the head, axilla or arm (Fig. 132).

In the case of a breech presentation, if the legs have torn away on traction being applied, a finger or blunt hook must be passed through the perforation in the abdomen, and traction made on the front of the fœtal pelvis.

If the tumour is solid the child must be eviscerated.

EMPHYSEMA OF THE CHILD.

CAUSE.

This is a very rare condition. If the child dies and becomes infected with the bacillus aerogenes capsulatus, its tissues become distended with gas, as also does its abdomen and thorax.

RESULT.

The body thus becomes so swollen that labour is obstructed.

TREATMENT.

The abdomen and, if necessary, the thorax must be punctured to evacuate the gas, and incisions may have to be made in other parts of the body of the child for a similar purpose.

TUMOURS OF THE SACRUM.

Spina Bifida.

Deficiency of the vertebral laminæ in the cervical and upper dorsal region is often seen in anencephali. Extroversion of the

spinal canal is also seen in the lumbo-sacral region unassociated with the before-mentioned deformity.

SIGNS.

The defect may present as a depressed area, covered by a vascular soft layer which represents the unclosed neural groove, or as a dimple or grooved depression in the skin of the back. Neither of these produce obstruction to labour. In other cases, however, the site of the vertebral deformity is occupied by a swelling which represents a local fluid distension either of the spinal meningeal sac (meningocele, meningo-myelocele) or of the cord itself (syringo-myelocele).

TREATMENT.

Such swellings may cause difficulty in delivery, though as a rule they do not. In the former case they must be punctured or incised.

Exogenous Teratomata.

Excrescences representing partial, irregular dichotomy of the fœtal axis are met with chiefly in the region of the breech (congenital coccygeal tumours).

RESULT.

Tumours of the lumbo-sacral and sacral region are unlikely to attain sufficient size to produce distension, and then only, as a rule, if the presentation is a breech.

DIAGNOSIS.

The condition is generally first noticed on birth of the child if the presentation is a vertex. In breech cases the diagnosis may be difficult, and may require the whole hand in the uterus to determine the nature of the presenting part.

TREATMENT.

As a rule no treatment is required. If delay results and the tumour is cystic, it can be tapped with the perforator. If it is solid it will have to be cut away with scissors.

RIGIDITY OF THE CHILD.

Occasionally children are born with the skin and subcutaneous tissue in a condition resembling solid œdema. This "hidebound" state renders the fœtus rigid, and prevents its adapting itself to the course of the genital canal.

TREATMENT.

The fœtus being usually premature does not, as a rule, give rise to difficulty in delivery.

If such occurs, it must be extracted by forceps traction, supplemented when necessary by amputation of the arms, cleidotomy, or evisceration.

CADAVERIC RIGIDITY.

If the child dies before delivery and remains *in utero* long enough (but not too long, when the rigidity will have passed off), cadaveric rigidity supervenes and causes a certain amount of delay in labour, due to the fact that the stiffened body of the child is unable to accommodate itself so well to the course of the canal.

DOUBLE MONSTERS.

There are four principal varieties of conjoined twins:

1. Two separate children joined in front at the thorax—Thorocopagus.
2. Two separate children joined at the back at the sacrum—Ischiopagus.
3. Two heads joined to one body—Dicephalus (Fig. 133).
4. One head joined to two separate bodies—Syncephalus.

RESULT.

Labour may take place prematurely or at full term, and in either case there are records of the monsters having been born without any trouble. On the other hand, they have at times caused obstruction of a serious degree. A thorocopagus and an ischiopagus generally presents by the feet, and as the monster is born the posterior head enters the pelvis first, and is followed by the anterior head.

If the heads present and are very small, the monster may be born with the upper head pressed in between the chin and chest of the lower head as it passes through the pelvis. If the heads are too large to allow of this method of delivery, the lower head having been born first, the two bodies are next born by a process of spontaneous evolution round the neck of the upper head, which is resting on the brim of the pelvis, and which is born last.

Dicephalic monsters also, as a rule, present by the feet, and are born in a way similar to that described above, as also they are when presenting by the head.

Syncephalic monsters are, as a rule (unless the head is very

small or the pelvis large), delayed when the head enters the pelvis, be it first or last.

DIAGNOSIS.

If the feet present, the condition may be mistaken for twins. If the head presents the diagnosis is unlikely to be made until forceps delivery has failed, and the hand has been passed into the uterus

Fig. 133.—Double Monster obstructing Delivery.

to ascertain the cause of the delay, when the connecting bond between the two bodies will be identified.

TREATMENT.

If the labour is progressing favourably and the feet are presenting, the practitioner will do best to carry the body or bodies well forward over the symphysis pubis, by which means the posterior head may be encouraged to enter the pelvis first. If the heads are presenting and do not pass together, evolution may be assisted by pulling on the body or bodies.

If, however, labour be at all obstructed, the practitioner should at once resort to the operative measures which seem best suited to the particular case, and the more readily in that the survival of such monstrosities is socially undesirable.

Thus, in the first two varieties of conjoined twins, the tissue joining the thorax or sacrum may be divided, and the children delivered separately, or the monster may be turned if it is presenting by the head. Failing these, decapitation, craniotomy, cleidotomy, and evisceration may have to be resorted to.

The third variety of conjoined twins may be turned if the heads are presenting, or the heads may be crushed, one head decapitated and the monster then turned, or the body may be eviscerated.

In the fourth variety the head may be crushed and the bodies eviscerated if necessary.

SINGLE MONSTERS.

It is not necessary here to describe the various possible forms of single fœtal monstrosities. Most of them are incompatible with live birth, and may give rise to difficulty in labour.

It will only be necessary to give a few details about three of them, namely, the anencephalic fœtus, the acardiac fœtus, and the fœtus with extroverted viscera.

Anencephalic Fœtus.

In this monster the vault of the skull is absent, and the brain is undeveloped. The cervical and upper dorsal regions of the spine are rigid, and the arches of the vertebræ in these situations are often in addition incomplete (spina bifida). The neck is rigid and the shoulders are frequently abnormally broad.

RESULT.

These monsters may give rise to difficulty in labour by reason of their rigidity and the undue breadth of their shoulders, or the shoulders may be normal in size but are caught by the cervix, which has been insufficiently dilated by the malformed head.

DIAGNOSIS.

The commonest presentation is that of a face, when the bulging eyes and absence of any vault to the skull will attract attention (Fig. 134). Transverse presentations are also common, or the monster may present by the base of the skull, in which case it can easily be recognised by the sella turcica, and the other cranial prominences.

TREATMENT.

If the head is presenting and there is any delay, the best method of delivery, supposing that there is no contra-indication, is to turn, afterwards dividing the clavicles if necessary.

If turning is contra-indicated, the head can be seized with the cranioclast and delivery thus effected, the clavicles being divided, or one or both arms being amputated if necessary.

Acardiac Fœtus.

Whatever form the acardiac fœtus takes, whether it be acephalic (without any head), acormic (with an undeveloped head and a rudiment of a body), or amorphic (without head, legs, or arms), obstruction to labour very seldom occurs. Rarely the acephalic

Fig. 134.—Anencephalus.

form may become very swollen and œdematous, in which case labour may be obstructed.

TREATMENT.

If necessary the monster must be cut up piecemeal.

Extroversion of the Viscera.

In these cases the outer abdominal wall is absent, and the small intestines and liver project into the amniotic cavity. In some instances the umbilical cord may be only 2 or 3 inches long.

The lie of the monster may be transverse, with its viscera presenting, and the short cord may cause difficulty and delay in delivery.

DIAGNOSIS.

If the child is in the oblique lie, the exposed viscera will be felt. They have given rise to a mistaken diagnosis of placenta prævia.

TREATMENT.

If the delay is due to the oblique lie of the child, it should be turned or decapitated. If due to the shortness of the cord, the case must be treated by the methods described on p. 429.

ABNORMALITIES IN THE LENGTH OF THE UMBILICAL CORD.

The umbilical cord may be longer than normal, or it may be shorter; either condition may be a cause of difficulty in labour.

Long Cord.

The average length of the umbilical cord is 20 inches. Cords as long as 6 feet have been reported.

If the cord is longer than usual, there is a greater chance of its presenting or prolapsing in front of the presenting part. It can also more easily become coiled round the child's body and form knots.

Short Cord.

The shortness of the cord may be either real or apparent, in the latter case being coiled round some part of the child. In either case it may cause an obstruction to delivery.

RESULTS.

The cord may break, the placenta may be separated, labour may be delayed, or the uterus may be inverted.

SIGNS.

If the expulsion of the head is hindered, and there appears to be no obstruction due to disproportion of the child or mother, an examination as to the cause may lead to the detection of the cord round the child's neck. The fact that the presenting part recedes during the interval of a pain, that associated with this condition there is some hæmorrhage between the pains, and that a dimple can be felt at the fundus when the child is pulled upon, are given as additional signs of a short cord. We have had no opportunity of verifying them.

TREATMENT.

Apparent Shortening.—If the cord is coiled round the neck of the child, a loop of it should be drawn down, if possible, over the head or shoulder. If this fails, the cord should be cut and the child delivered as quickly as possible with forceps or traction on the breech if necessary.

Real Shortening.—The cord must be divided and the child forthwith delivered.

KNOTS, COILS AND TWISTING OF THE CORD.

The *knot* may be loose or tight. In the latter case, if it has long been formed Wharton's jelly will have atrophied. Rarely

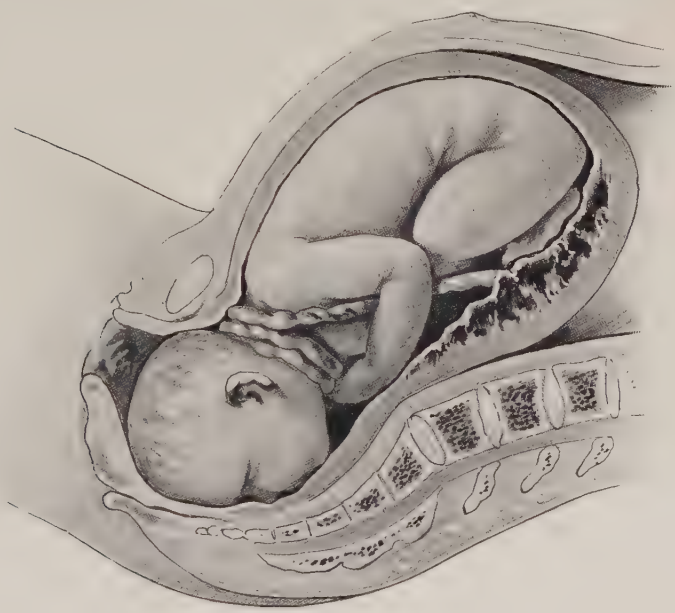


FIG. 135.—Delay in the Birth of the Child. Umbilical Cord coiled round Child's Neck.

the umbilical vessels may be constricted, in which case the child perishes. The cords of twins may become entangled and knotted.

The umbilical cord may be *coiled* one or more times round the neck of the child or round various parts of its body. Such coils may asphyxiate the child, or so shorten the cord that the complications already mentioned as associated with diminished length may arise (Fig. 135).

The cord may become so *twisted* that its vessels are occluded and

the child perishes. This twisting is thought to be due to the movements of the child.

PRESENTATION, PROLAPSE OR EXPRESSION OF THE UMBILICAL CORD BELOW THE PRESENTING PART.

CAUSE.

If the presenting part does not fit the lower uterine segment properly, the cord is able to get below it. Any condition, therefore, which hinders such adaptation is a cause of this misplacement, such as contracted pelvis, more especially the flat variety, breech and transverse presentation, twins, dead or premature children, and tumours of the pelvic organs.

Other causes are a very long cord, placenta prævia, and hydramnios.

DIAGNOSIS.

If the child is alive no mistake can be made. In the absence of pulsations in the cord, the extroverted intestine of a monster has been diagnosed as the cord.

TREATMENT.

The treatment will differ according to the nature of the misplacement.

Presentation of the Cord.

In this condition the cord lies below the presenting part before the membranes are ruptured.

The chief point is to keep the membranes unruptured as long as possible, since only on rupture does the child become endangered.

Meanwhile an endeavour may be made to rectify the malposition by placing the woman in the genu-pectoral position for a few pains, or on the side opposite to which the cord is prolapsed, especially if there is lateriversion of the uterus. A transverse presentation of the child may be corrected by external or bipolar version, and if there is evident contraction of the pelvis this should be dealt with on the proper lines.

Prolapse of the Cord.

In this condition the cord prolapses into the vagina directly after the membranes are ruptured. It may be secondary to presentation, or the cord may first come down on rupture of the membranes (Fig. 136).

The treatment depends upon the size of the os.

Os dilated sufficiently to get the Hand into the Uterus.—Manual Reposition.—A loop of cord should be taken between the fingers, carried up into the uterus and hung over a limb. The

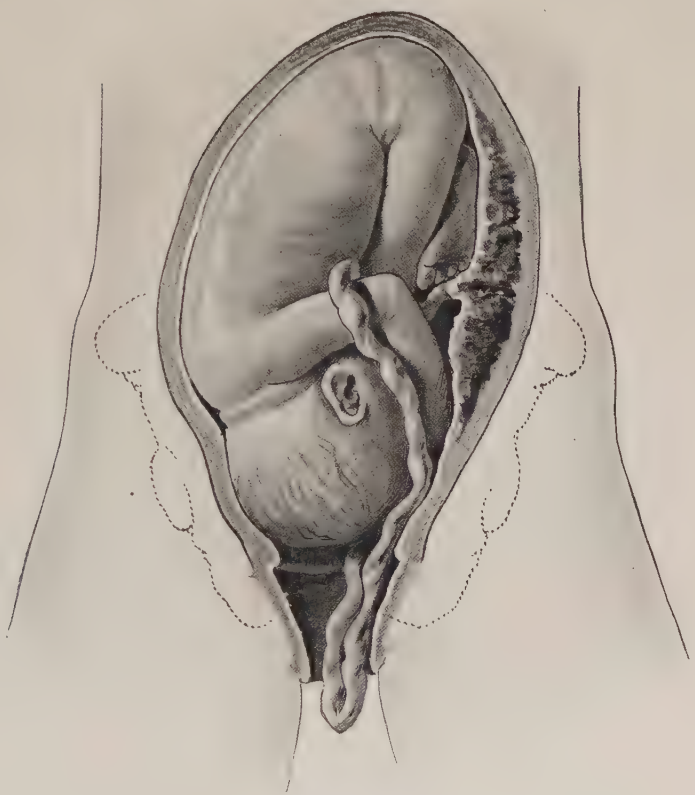


FIG. 136.—Prolapse of the Umbilical Cord.

external hand presses the head into the brim as the internal hand is withdrawn (Fig. 137).

Manual reposition may be essayed with the patient in the knee-chest position.

Forceps or Version.—Manual reposition is not always successful, especially if some time has elapsed since the rupture of the membranes.

In this case if labour is advancing quickly and the pulsation of the cord does not indicate that the child is in any urgent danger,

the cord may be placed upon one side and the immediate delivery awaited.

In the absence, however, of the imminent termination of labour, the child should be forthwith extracted with forceps or by

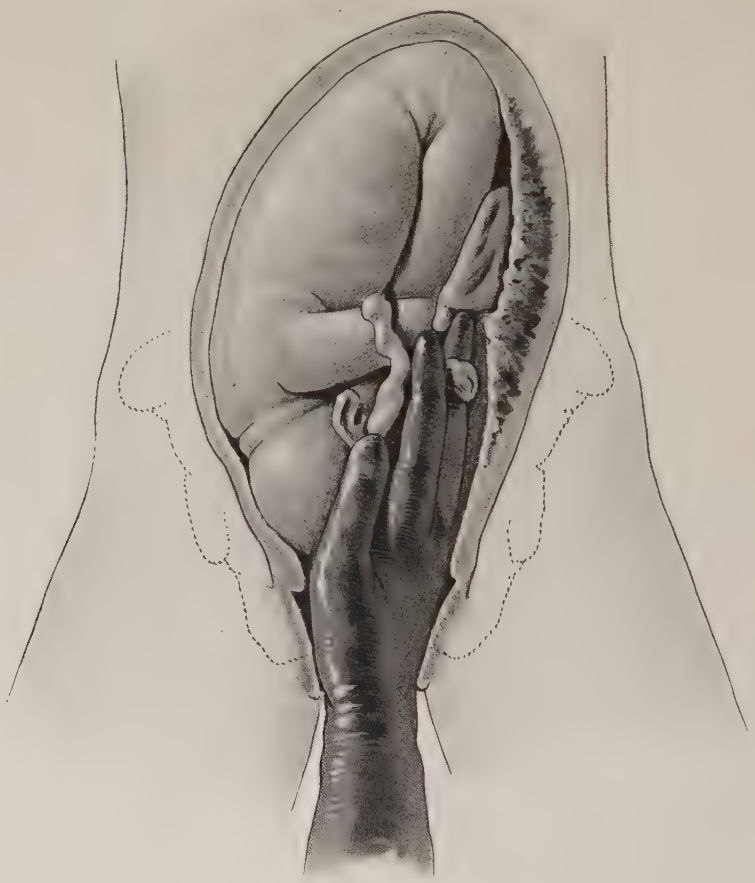


FIG. 137.—Prolapse of the Umbilical Cord. Manual Reposition of the Cord.

version; in either case the cord should first be carried up above the presenting part by the operator's hand (Fig. 138).

Os not sufficiently dilated to get the Hand into the Uterus.—Champetier de Ribes' Bag.—The cord should be replaced and a de Ribes' bag inserted. It must, however, be particularly remembered that unless the cord is pushed up well above the bag, the latter will press upon it and the child will be asphyxiated.

Funis Repositor.—A loop of tape is passed through the eye of a gum elastic catheter, and in this loop a piece of cord is placed; the repositor and cord are then pushed up into the uterus and left there This may be tried if a bag is not available.

Cæsarean Section.

Cæsarean section has been successfully employed for cases of prolapse of cord, and affords a better chance to the child than either of the afore-mentioned proceedings.

Expression of the Cord.

A condition when the cord is actively forced past the presenting

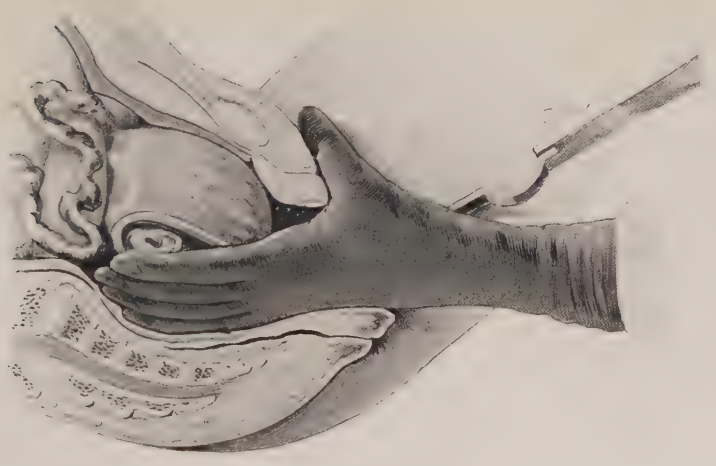


FIG. 138.—Prolapse of the Umbilical Cord. Application of Forceps after Replacement of the Cord.

part some time after rupture of the membranes. This is the most serious variety of misplacement of the cord, and is associated with a contracted pelvis or other grave obstruction.

The treatment must be principally directed towards overcoming the obstruction. In many cases the cord is already pulseless when first felt. As all the liquor amnii will probably have escaped, version will not be practicable as a rule. If the cord is pulsating and forceps are indicated, it should be carried up above the presenting part before applying them.

As pulsation in the cord is arrested some little time before the child dies, its cessation during the necessary manipulations should not deter the practitioner from carrying them to their conclusion.

CHAPTER XXIV.

Labour Complicated by Rupture of the Genital Canal and the Parts adjacent to It.

RUPTURE OF THE UTERUS.

THERE are two varieties of rupture of the uterus, intra-peritoneal and extra-peritoneal, according to whether the peritoneal cavity is involved or not.

Intra-peritoneal Rupture.

There are two forms of this, according to whether the rupture is complete or incomplete.

Complete.—In complete intra-peritoneal rupture the muscle and peritoneal covering are torn through.

This is by far the commonest variety of rupture, and the tear may take place at any part of the uterine wall, though, as we shall see later, it is nearly always in the posterior wall of the lower uterine segment.

Incomplete.—In this case the peritoneal covering only is torn.

These cases are very rare, and undiagnosable except by operative exploration.

This form of rupture has been found in association with accidental hæmorrhage.

Extra-peritoneal Rupture.

There are two forms of this, according to whether the rupture is complete or incomplete.

Complete.—In complete extra-peritoneal rupture the decidual coat and muscle are torn through. This is by far the commonest variety of extra-peritoneal rupture, and is due most often to operative manipulations.

The lateral walls of the lower uterine segment are most often torn, the tear running up from the cervix into the broad ligament.

Incomplete.—In this case the decidual coat remains intact and only the muscle coat is torn.

Knauer some few years ago specially drew attention to this rare form, more particularly from the point of view of diagnosis, see p. 439.

CAUSE.

Rupture of the gravid uterus during labour may occur spontaneously as a result of operative manipulations or from violence.

Spontaneous Rupture.—There are three conditions under which spontaneous rupture occurs:

1. Abnormal weakness of the uterine wall.
2. Obstructed labour and tonic contraction.
3. Precipitate labour.

Abnormal Weakness of the Uterine Wall.—It was pointed out by T. Hicks that spontaneous rupture of the uterus is most often met with in multigravidæ, in whom more or less degeneration of the uterine wall due to repeated childbearing has occurred. The appreciation of this fact is very important, because teaching has always laid most stress on obstruction as the first factor in the causation of rupture.

Thus the disaster often occurs in a class of case in which from teaching and superficial considerations it may be least apprehended, with a result that there is often delay in recognising it.

A flaccid condition of the abdominal parietes, depriving the uterus of support, or permitting extreme anteversion or obliquity of the organ, allows of such alteration in its axis as to add an obstructive factor to the weakness of the uterine wall. Anteversion due to ventrofixation has the same effect, not only in labour but also during pregnancy.

The scar of an old Cæsarean operation may rupture.

Spontaneous rupture of the uterus affects the lower segment as a rule, and the symptoms may be very equivocal at first, and not in the least resembling in dramatic suddenness the classical picture of the event when it supervenes on tonic contraction in obstructed labour.

Obstructed Labour and Tonic Contraction.—In definite obstruction the uterus passes into a condition of tonic contraction, which if unrelieved may terminate in rupture. For the signs and symptoms of this condition see p. 297.

When the obstruction is situated, as it most commonly is, at the pelvic prim, the seat of rupture is the posterior wall of the lower uterine segment, the upper contracting segment tearing off, so to speak, from the lower expanded segment. Commencing in the lower uterine segment, the tear may run outwards and involve the peritoneum of the broad ligament.

In obstruction below the brim, the seat of rupture is the cervix or the posterior vaginal vault.

Spontaneous rupture due to tonic contraction is, however, rare nowadays, because the marked symptoms that precede the giving way of the genital canal compel the attention of the attendant and lead to early measures for relief of the obstruction.

Precipitate Labour.—The uterus may rupture as the result of inordinately strong contractions in the absence of gross obstruction. In some of these cases the administration of pituitary extract has seemed to be the determining cause. Most of these lesions begin as ruptures of the cervix, which, extending upwards, involve the uterine body. Spontaneous rupture of the cervix, as will be shown, p. 452, is most commonly the result of premature rupture of the membranes, the relatively incompressible head being violently forced through a partially dilated os. Occasionally the rupture affects the supra-vaginal part of the cervix only and does not extend to the vagino-cervical junction.

Most of the ruptures of the uterus which initiate in the cervix are lateral, and as such are extra-peritoneal, opening out between the layers of the broad ligament.

Operative Rupture.—The commonest type of operative rupture has already been referred to, namely, that in which it is the result of manipulations carried on in a uterus the seat of tonic rigidity. The operation most commonly responsible is internal version, see p. 601, but it may happen in the endeavour to bring down extended arms or legs, during the extraction of the after-coming head, or whilst attempting to rotate or flex the head or get a decapitating hook over the neck.

The rupture is usually in the already thinned lower segment (Fig. 139), but the cervix may be torn by the hand being forcibly thrust through it.

Exceptionally the fundus or upper segment may be perforated by the fingers or instruments.

The liability to rupture an incompletely dilated cervix by dragging the head through it with forceps is referred to on p. 452. Such ruptures may extend into the body. They are usually lateral and extra-peritoneal.

Forcible expression of the after-coming head may produce the same effect.

Rupture due to Violence.—Occasionally the uterus is ruptured by direct violence, such as assault, gun-shot wounds or tossing by cattle.

SYMPTOMS AND SIGNS OF RUPTURE.

The immediate results of rupture are shock and hæmorrhage.

The rapidity with which these occur depends a good deal upon the type of rupture.

If the rupture is operative in nature, they appear very quickly; if, on the other hand, it has occurred spontaneously and the rupture is a slowly progressive one, some time may elapse before they become marked. These are the cases likely to be overlooked.

As the symptoms differ according to whether the rent is intra-peritoneal or extra-peritoneal, it will be convenient to discuss them under these heads.

Intra-peritoneal Rupture.—**Complete Rupture.**—When the rent involves all the coats, the characteristic symptoms are due to hæmorrhage into the peritoneal cavity, accompanied by shock.

The amount of blood thus lost is generally considerable, and may be very great if the large vessels are torn.

The patient may definitely state that she has felt something give way, especially in those cases which supervene on tonic contraction with a healthy uterus. On the other hand, in the type that occurs in multiparous women with a degenerate uterus, the symptoms and history may be much less pronounced, probably because the rupture is slowly produced by successive pains.

Following the rupture and synchronous with the escape of blood into the peritoneal cavity, general abdominal pain is complained of, increasing in intensity.

The pains due to uterine contraction are altered according to the degree of injury to the uterus.

If the child has been expelled into the peritoneal cavity, they cease at once; if it has not, they will cease only after the lapse of some time.

The patient becomes blanched and cold, and the pulse rises greatly in rate, and falls markedly in power and volume. The abdomen becomes tender and rigid, and after the lapse of some hours an increasing flatulent distension is noticeable. The fœtus may escape into the peritoneal cavity or it may not. In the former circumstance the presenting part is withdrawn from vaginal touch, and the child and uterus can be separately palpated from the abdomen. In the latter, if the presenting part is not impacted, it may become movable and recede, but if tightly wedged it will not move.

But little blood escapes into the uterus as a rule, and this may never reach the vagina, being retained by the presenting part.

The intestines or omentum may prolapse through the rent, especially if it is situated in the upper segment of the uterus.

Whenever the rupture occurs while the patient is under an

anæsthetic, no symptoms other than unduly rapid pulse and an unnatural pallor may be present, until the effects of the anæsthetic have passed off.

Incomplete Rupture.—Rupture of the peritoneum only is a rare

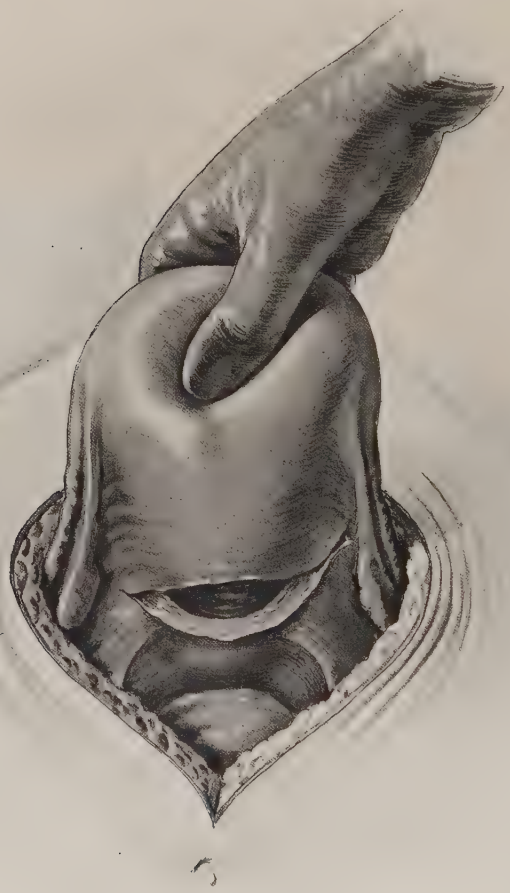


Fig. 139.—Rupture of the Uterus. Posterior Wall, Lower Uterine Segment.

condition. It will not be diagnosed short of an abdominal section or *post-mortem* examination.

Such a rupture may be suspected when, in spite of the fact that no rupture can be found on exploring the uterus, symptoms and signs of internal hæmorrhage or those of local peritonitis manifest themselves.

Extra-peritoneal Rupture.—**Complete.**—In this variety we meet with two forms: one in which the escaping blood chiefly accumulates in the broad ligament and utero-vesical space, and one in which it flows externally.

Ruptures of this sort are most often those which have extended from a cervical laceration. In those characterised by free external bleeding, retraction of the torn edges of the wound has not taken place, and the blood that escapes is chiefly venous in character.

In cases, on the other hand, where such retraction does occur, the hæmorrhage chiefly comes from the arteries lying in the layers of the uterine wall adjacent to its external surface, and extravasates between the layers of the broad ligament.

The symptoms of extra-peritoneal hæmorrhage are very similar to those of intra-peritoneal bleeding, except that the pain is markedly referred to one side.

In complete extra-peritoneal rupture, as in intra-peritoneal rupture, the bleeding is principally extra-uterine, and accumulates in the retro-peritoneal tissue, to form there an extensive hæmatoma. In one case in our experience this extravasation, after exhausting the capacity of the broad ligament, mounted up along the flank until it reached the diaphragm. In some of these cases it is from the torn uterine artery itself that the blood is flowing.

It is important to know that hæmorrhage under the peritoneum covering the posterior abdominal parietes produces *even more marked flatulent distension of the intestines* than that taking place into the peritoneal cavity. This is probably due to interference with the splanchnic nerves. A similar phenomenon is seen in hæmorrhagic pancreatitis.

Incomplete Rupture.—These are the cases in which the muscle only and not the decidua is torn; the blood therefore accumulates between the layers of the broad ligament. They may cause difficulty in diagnosis from concealed accidental hæmorrhage, since they give rise to the symptoms and signs of internal bleeding.

DIAGNOSIS.

Where the rupture supervenes on the classical picture of tonic contraction, and particularly if the fœtus escapes into the peritoneal cavity, the condition is very unlikely to be mistaken. These, however, are exceptional cases.

The appearance of symptoms of collapse, accompanied by pallor and rapid pulse unexplainable from any known circumstances of the

labour, should always arouse suspicions of a ruptured uterus, which the absence of external hæmorrhage should not allay.

Where the child is still *in utero* the diagnosis can only be made absolute by exploring its cavity. It may be possible to do this without previously extracting the child, but in other cases delivery must first be effected.

Thus in the first stage the hand should be inserted under an anæsthetic; but in the second, especially with the head low down, immediate extraction by forceps, or by perforation and cranioclasm if the urgency of the case warrants it, is indicated, after which the cavity of the uterus should forthwith be explored.

When the rupture is produced as the result of operative procedure, the giving way of the uterus may be at once recognised during the manipulations, but this is not always the case. This possibility of having unknowingly ruptured the uterus is best met by making it a rule to explore the cavity with the hand at the termination of every labour that has necessitated intra-uterine manipulations. Other still stronger reasons for this practice are adduced elsewhere, see p. 277.

Rupture of the uterus during the first stage of labour may be mistaken for accidental hæmorrhage. The characteristic rigidity and distension of the uterus that obtains in the latter is, however, lacking in rupture. Partial rupture, with profuse external bleeding occurring before the head has passed through the cervix, might be confounded with placenta prævia, but exploration with the hand would immediately reveal the error.

After the delivery, bleeding from the placental site may be mimicked. Here, again, the routine practice of uterine exploration, see p. 277, will reveal the true condition. In every case where the uterus is explored for post-partum hæmorrhage, the possibility of a ruptured uterus should be borne in mind. It is in forgetfulness of this disaster that attempts have been made to tear away a mass of prolapsed omentum or intestine, under the impression that it represented a retained portion of the after-birth.

Where a woman directly after labour complains persistently of pain, something is amiss, possibly rupture of the uterus; where, with the pain, there is increasing rigidity of the abdomen and flatulent distension, rupture is strongly suggested.

In all such circumstances it should be the practitioner's plain rule to explore the uterus before attempting to make a diagnosis. The failure to observe this practice has often been disastrous to the patient.

PROGNOSIS.

The prognosis to the mother is very bad in complete intra-peritoneal rupture; taking all cases, it works out at about 90 per cent. Since the more modern methods of treatment have been carried out, the mortality has fallen to between 50 and 60 per cent.

In extra-peritoneal rupture the mortality is not nearly so high.

The mortality of the children is about 95 per cent.

TREATMENT.

Early diagnosis is the first consideration in the successful treatment of a ruptured uterus. The heavy mortality which attends the disaster is chiefly due to the fact that there is usually delay in recognising it, and further wastage of time before it is treated. The diagnosis having been made, the child must be delivered at once and the uterus then treated.

Completion of the Delivery.—If the child has escaped into the abdominal cavity, it must be removed in the course of the operation thus necessitated. If the child is still in the uterus, its immediate delivery is called for. In those rare cases in which the os is still so small that rapid extraction of the perforated head is impossible, it must be delivered by abdominal Cæsarean section, preferably through the rupture already present, which may be enlarged for the purpose. In all other cases it should be extracted through the vagina, the head being perforated to expedite matters, and that with less scruple because the life expectation of the fœtus is already negligible.

The child being delivered, the hand should be introduced, the placenta manually removed, and the rent investigated.

Where the birth of the child is already completed before the nature of the occurrence is discovered, the placenta, if still in the uterus, should be likewise extracted.

Treatment of the Uterus.—On the position and extent of the rupture will depend the methods of treatment to be further adopted, which are as follows:

Intra-peritoneal suture of the rent.

Intra-peritoneal hysterectomy.

Vaginal suture of the rent.

Vaginal packing of the rent.

Intra-peritoneal Suture of the Rent.—Where the rupture is intra-peritoneal it may be sutured through an abdominal incision.

The operation is not at all a difficult one, because through the wound in the flaccid parietes the relaxed uterus can be readily drawn upwards and forwards and the rent exposed. With the full

outfit of an operating theatre it would be a simple undertaking, but in most cases the operation has to be performed in the stress of emergency and with such appliances as may happen to be at hand at the moment. It will be more profitable, therefore, to describe the operation as it should be performed in the latter circumstances.

Assistance.—In regard to assistance, an anæsthetist is, of course, required. The duties of the operator's assistant can be carried out by an ordinarily capable nurse. She should be specially directed to sterilise her hands as perfectly as possible. A second medical man would, of course, be an advantage to the operator, but he may not be obtainable.

Instruments.—In regard to instruments, a scalpel, a couple of pairs of pressure forceps, a dissecting forceps, and two large curved needles are sufficient. In emergency, the abdomen can very well be opened with scissors. A sterilised tongue forceps is a very useful implement for picking up large masses of tissue such as the edges of the rent in the uterus.

Any properly fitted midwifery bag contains the instruments named. For suture material, a reel of domestic pack-thread used double for the mass sutures will do admirably. The silkworm gut or catgut carried for the purposes of perineal repair may also be used.

The instruments and ligature material should be boiled while the patient is being anæsthetised. As to swabs, the operator should avoid using a number of pieces of wool impossible to keep count of and liable to be left in the abdomen. In order to shut off the intestines, a small clean face towel or diaper will suffice. It may be boiled or simply steeped in mercurial solution (1 in 1,000) and then wrung out in warm water. For swabbing, four clean handkerchiefs or diapers will suffice. They may be sterilised in the manner already described. Two bowls of warm water should be available to wring the swabs in. This may be done either by the operator or the assistant.

Preliminary Measures.—It is of the utmost importance to empty the bladder with a catheter before proceeding with the operation. The patient after anæsthetisation should be transferred from the bed to a table, a narrow one if possible. The advantages of Trendelenburg's position can be partially obtained by raising one end of the table on an upturned box, fender, or any similar object, and further by lashing several pillows and bolsters together into the form of a wedge, which is placed under the patient's buttocks (Fig. 140).

The operation area should be painted with tincture of iodine, the pubes being dry shaved if there is time, or the abdomen can

be washed with soap and water, and then well swabbed over with whatever antiseptic solution has been used during the labour. Methylated spirits, if at hand, is an admirable means of sterilising the superficial layers of the skin.

The patient is now draped with towels clean from the wash, leaving only the operation area exposed. The operator should stand on the right-hand side of the patient with his instruments and ligatures beside him.

Operation.—The abdomen should be opened by a median incision at least 5 inches long, its lower end being about 1 inch above the pubic bone. The uterus should be immediately grasped and

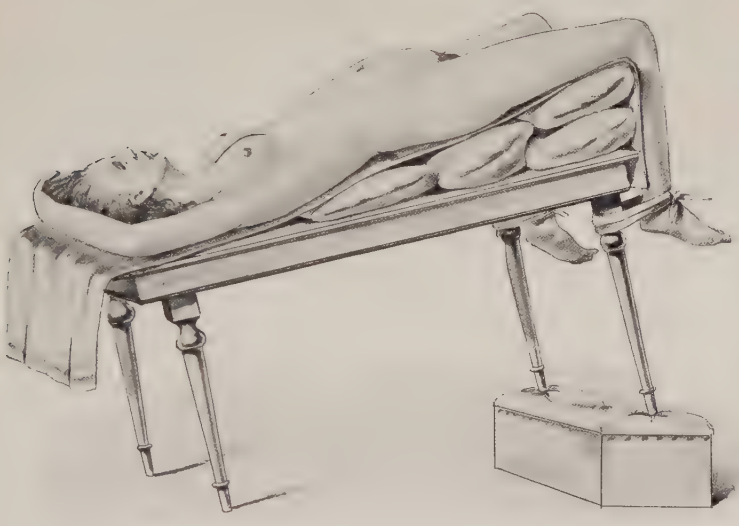


FIG. 140.—Extemporised Trendelenburg Position.

pulled forwards out of the wound. The intestines should then be pushed back into the upper abdomen and retained there by packing in the towel prepared for this purpose. A quantity of blood in the pelvis will probably require mopping out, after which the rent in the uterus should be inspected. Most commonly it will be found to start in its posterior wall low down, and to run from thence outwards and upwards, to terminate in the back of the broad ligament. With a recently delivered uterus it is often impossible to demarcate the vagina from the cervix.

The sutures should now be inserted. Two rows are required, the first and most important being of the mattress or Halstead variety, as illustrated in Fig. 141. This suture when tied effects hæmostasis

in the parts distal to it, and a series of them will control the hæmorrhage from the rent almost entirely. The lowest end of the rent, *i.e.*, that deepest in the pelvis, should be first sutured, and each suture should be tied before the next is inserted, its ends being left long and used as a tractor to bring the region of the next suture more

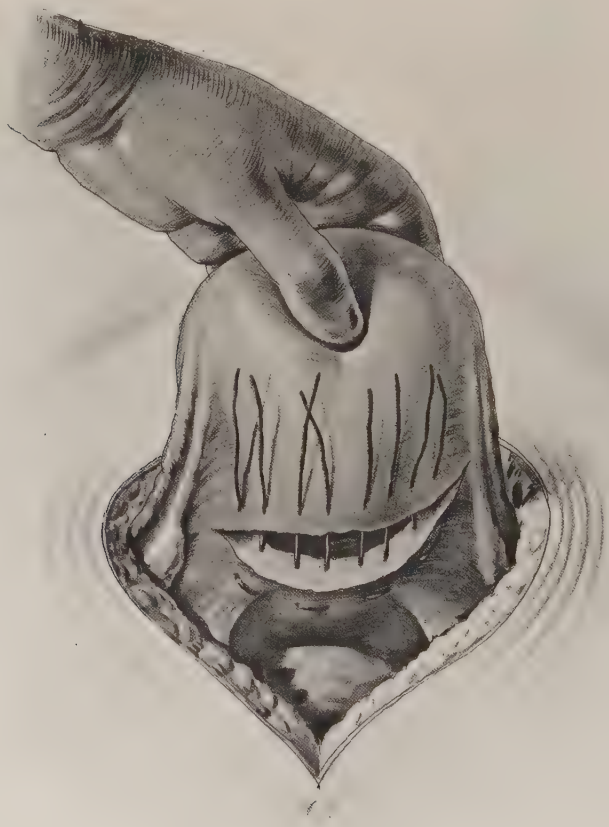


Fig. 141.—Rupture of the Uterus. Insertion of the Mattress Sutures.

easily within the operator's reach. The sutures must be passed deeply, but if possible not into the uterine cavity. In the passage of the needle a large vein or artery may be pricked and free bleeding come from the puncture hole. This usually stops as the suture is tied, but if it does not, a second suture should be inserted under the first.

The deep sutures having been all inserted and tied, the long ends are cut and the operator then proceeds to apply a superficial continuous suture along the whole length of the now closed rent. This

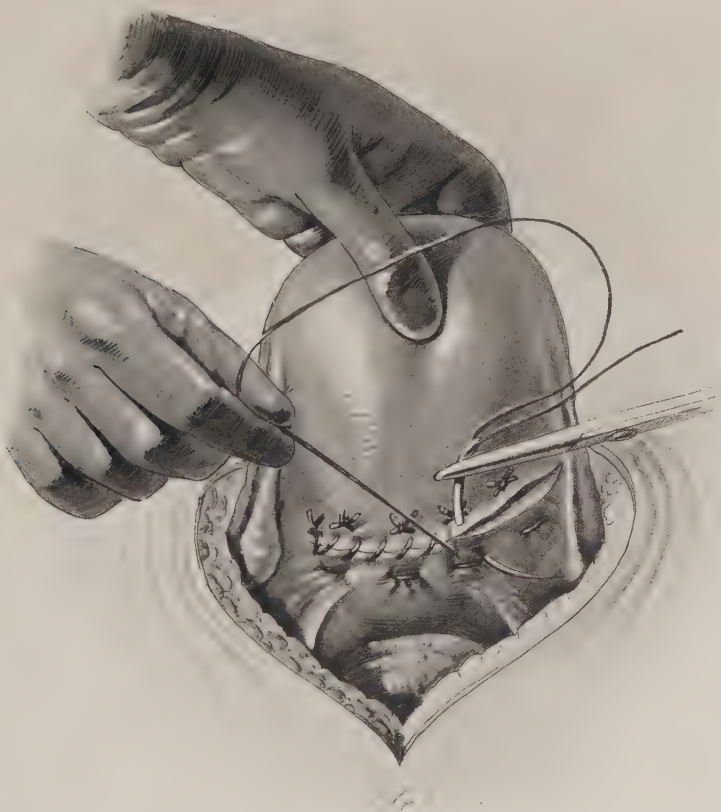


Fig. 142.—Rupture of the Uterus. Continuous Peritoneal Suture.

approximates the peritoneum over it, and stops any slight oozing that may yet remain (Fig. 142).

Like the first-row sutures, it should be begun at the deepest and most inaccessible end of the rent.

The uterus should now be dropped back, and any blood not already mopped out should be removed. If the bleeding has been at all free, there is sure to be a collection in either flank.

The towel retaining the intestines being removed and the total number of swabs being verified, the abdominal wound should now be closed.

If the condition of the patient is bad, a single layer of through-and-through sutures should be used.

Where there has been great loss of blood, 2 or 3 pints of normal saline solution at a temperature of 100° F. may be advantageously poured into the peritoneum beforehand, and if the pulse is alarmingly fast and small, intra-venous saline infusion should at once be performed; but where the patient is suffering more from shock than from hæmorrhage, it is better to treat it by rectal and subcutaneous saline infusion, see pp. 505 and 710, strychnine and pituitary extract. She should be nursed sitting up, to promote drainage from the uterus.

Intra-peritoneal Hysterectomy. **Indications.**—Removal of the ruptured uterus is to be preferred to suture of the rent, when, from the circumstances of the labour, it is probable that the genital tract is already gravely infected, when the injury is so extensive as to render satisfactory suture impossible, and when the presence of a myoma or a defective Cæsarean scar makes the uterus not worth conserving.

The operation is more difficult than simple suture and is followed by more shock, so that, in the absence of the circumstances named, we believe suture of the rent to be the procedure of election.

For those untrained in the practice of hysterectomy, and where the instruments at hand are limited to those mentioned on p. 442, we believe the following technique to be the best.

In circumstances of emergency the same preparatory details already described should be observed.

Operation.—The abdomen opened and the intestines packed off, the uterus is pulled well forwards and the top of the broad ligament on one side is transfixed below the line of the ovarian vessels and round ligament, and a double ligature thread carried through it. This double ligature is now divided so as to form two single ligatures, one of which is tied round the cornu of the uterus and the other about an inch further out, just within the inner pole of the ovary. The broad ligament is then divided between the two ligatures.

The same procedure is then carried out on the opposite side.

By means of the forefinger inserted between the layers of the broad ligament, the movable peritoneum covering the lower uterine segment is next undermined across the middle line, lifted up, and divided so as to form an anterior peritoneal flap.

The exposed cervix is now transfixed from before backwards about an inch from its lateral margin, and the ligature so inserted is tied on its lateral aspect so as to secure the uterine artery of that side. The same procedure having been performed on the other side, the uterus is amputated transversely about three-quarters of an inch above the ligatures. On the surface of the stump is seen the lumen of the cervical canal. Bleeding from the cut edges invariably occurs, and must be controlled by two or three mattress sutures, see Fig. 141, passed through both anterior and posterior cervical walls.

All further bleeding points having been controlled, the anterior peritoneal flap should be continuously sutured to the posterior edges of the cut broad ligaments laterally, and to the peritoneum covering the back of the cervix in the middle line.

If infection is to be feared, a drainage tube should be inserted through the abdominal wound.

Vaginal Suture.—Where the uterine rent has extended into the vaginal vault it is possible to suture it from below.

The patient must be placed in the lithotomy position in a good light, and a broad retractor is required to obtain a proper view.

The vagina having been mopped clean of blood, an endeavour should be made to remove by hand and by swab that which has escaped into the peritoneal cavity.

The suturing should be begun at the upper part of the rent and the sutures should be of the mattress variety, the ends being left long to pull the parts into a position of greater accessibility.

Vaginal Plugging of the Rent.—The patient must be anæsthetised and placed in the lithotomy position. The extent of the damage should then be explored with the hand, and afterwards inspected as far as may be with a speculum, all blood clot having been swabbed away. If a definite bleeding point or area can be made out, this should be seized and clamped with a forceps. Ring or sponge-holding forceps are best adapted for this, but in their absence an anæsthetist's tongue forceps, sterilised, will do. Unless the bleeding point is very accessible it is best not to attempt to tie it, but simply to leave the forceps on. The packing should now be proceeded with, gauze being the best substance to use as far as the rent and uterus is concerned, but the vagina underneath may be filled up with wool tampons. The gauze or forceps should not be left *in situ* for more than forty-eight hours, and a careful watch must be kept that bleeding is not going on internally.

On the Choice of Methods.—In all cases in which a rent of the uterus involves the peritoneum, we believe immediate abdominal operation to be the proper course. Suture, in our opinion, is

preferable to hysterectomy, in the absence of the circumstances named on p. 446. An intra-peritoneal rupture on the posterior aspect of the cervix and invading the posterior vaginal vault may be suitably treated by vaginal suture, if it is easily accessible and it is certain that a large quantity of blood has not escaped into the peritoneum. Incomplete extra-peritoneal tears should be treated by plugging the uterus and promoting strong retraction by ergotin.

Extra-peritoneal ruptures are also best treated by plugging, provided that the bleeding is either not great or, being so, can be first controlled by the application of pressure forceps.

The attempt to check profuse arterial hæmorrhage by gauze pressure alone is certain to fail.

In the more serious event, or where gauze packing has been tried and failed, the only course left is to open the abdomen and secure the bleeding point from above. To do this hysterectomy will probably be necessary.

Gauze packing as a method of treating a ruptured uterus has been commended, on the ground that it saves the patient the additional shock of an abdominal operation. To anyone who has inspected a uterus ruptured into the peritoneum through an abdominal wound, the utility of plugging in all such cases must appear more than doubtful, for in such the hæmorrhage is taking place from torn arteries close under the peritoneal coat which plugging could not control.

In extra-peritoneal ruptures, particularly those that are incomplete, the method has more reason, for in such there is a limited cavity into which the gauze can be packed and pressure exerted.

RUPTURE OF THE VAGINA.

VARIETIES.

The vagina may rupture into the bladder, rectum, peritoneal cavity (Fig. 143), or into the cellular interval between the bladder and cervix, or laterally into the paravaginal cellular tissue.

CAUSES.

The commonest cause of rupture of the vagina is an extension downwards from a deep laceration of the vaginal cervix.

Rupture of the vagina is also due directly or indirectly to obstructed labour. In cases of transverse presentation especially, and pendulous abdomen accompanying contracted pelvis, the vaginal wall may be so stretched by the retraction of the uterus that it may

be torn right away from the cervix, especially posteriorly, and in this case the rupture extends into the peritoneal cavity.

The vagina may be ruptured by maladroitness in turning or putting on the forceps. It hardly seems possible that anyone could, in applying the forceps, push the blades through the posterior fornix into the peritoneal cavity and deliver intestine into the vagina, but this has been done. In some instances where this accident has been reported, it has been partly due to the patient struggling when only half under the influence of chloroform.

Again, the vagina may rupture spontaneously for no apparent reason. The only case we have met with of rupture of the vagina into the peritoneal cavity was due to such a cause. The practitioner reported that the patient had had a rapid labour, followed by a little post-partum hæmorrhage and more shock. Three days later, on sepsis supervening, an examination revealed a tear in the vaginal roof leading into Douglas's pouch. There was no laceration of the cervix.

Ruptures into the bladder or rectum are considered on pp. 455 and 457. As a rule, they are due to instrumental delivery, but may follow on very prolonged pressure by the fœtal head in cases of contracted pelvis. Finally, fibroid or ovarian tumours have been forced through the posterior fornix in the course of obstructed labour.

SYMPTOMS AND SIGNS.

Rupture of the vagina is accompanied by more or less free external hæmorrhage and shock. The symptoms resemble rupture of the uterus, but the hæmorrhage is less apt to be concealed and the shock is less marked.

DIAGNOSIS.

An exploration of the vagina readily discloses the fact that the vagina is ruptured, and it is a proceeding which should never be omitted at the close of a prolonged and difficult labour.

Intestine, especially a coil of the sigmoid colon, is very liable to prolapse through the rent. In practically every case the child has already been delivered before the nature of the accident is apparent.

PROGNOSIS.

Vesico-vaginal and recto-vaginal ruptures heal as a rule fairly quickly if properly sutured; rupture into the cellular interval is usually recovered from, but rupture into the peritoneal cavity has

rather a serious prognosis, partly due no doubt to the fact that the injury is not always efficiently treated.

TREATMENT.

Either form of rupture may be treated by suture or plugging. Suture is the method of election if the necessary apparatus and

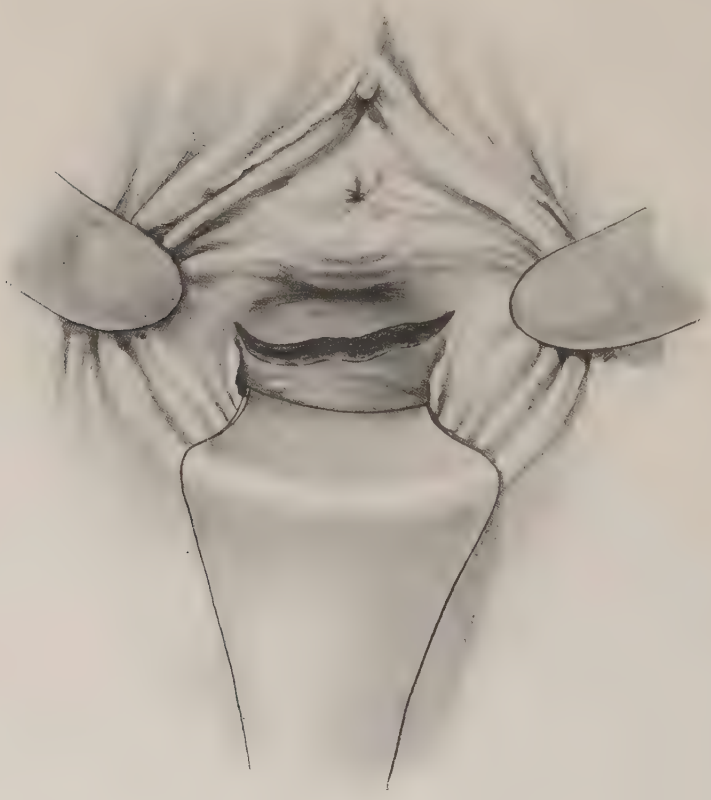


FIG. 143.—Laceration of Posterior Vaginal Wall.

assistance is at hand. It is best performed from the vagina, though in intra-peritoneal rupture it might be done through an abdominal wound.

The patient being placed in the lithotomy position, a broad retractor should be inserted into the vagina, and that canal mopped free of blood.

The anterior or posterior lip of the cervix, as may be most con-

venient, is then seized with ring forceps and pulled down so as to render the vaginal vault more accessible. The limits of the rent should now be defined by attaching to its edges several pressure forceps.

If the peritoneal cavity has been opened, care should be taken that any prolapsed intestine is completely returned after it has been

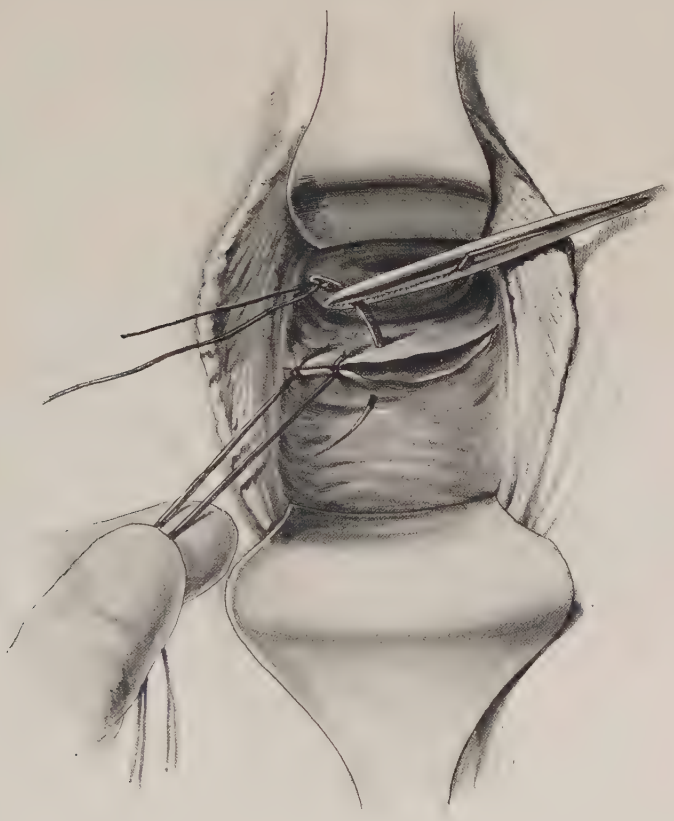


Fig. 144.—Laceration of Posterior Vaginal Wall. Insertion of Sutures.

thoroughly cleaned, and any accumulation of blood in the utero-rectal pouch should be mopped out by a swab mounted on a forceps. In the event of rupture into the cellular interval, a rent in the bladder should be excluded.

The wound should be closed by mattress sutures, which, if properly placed, should entirely control any oozing from the edges (Fig. 144).

The vagina should then be well swabbed out (not douched) with

an antiseptic solution and subsequently packed with sterile gauze. If the case is reasonably held to be already infected, a small wick of gauze should be passed between two of the sutures, in order to leave a track in case of future suppuration outside the vagina. The vaginal plug should be removed in twenty-four hours and the vagina swabbed out with an antiseptic solution several times a day. No douche should be given for at least a week.

As regards suture material, the practitioner will have to make use of that available at the time. Pack-thread, silk, catgut, or silkworm gut may be used. The latter will have to be removed sooner or later on account of its sharp ends and indestructible nature, but both silk and catgut may be allowed to separate spontaneously.

If the vaginal cervix be simultaneously ruptured it should be repaired at the same time and in the same manner as the vaginal laceration, see p. 455.

The alternative treatment of plugging the rent is to be adopted when the material and assistance necessary for suture is not obtainable. The proceeding has a better *rationale* than in rupture of the uterus, because the hæmorrhage is as a rule less severe and tends to flow into the vagina. To plug the rent properly, a speculum or vaginal retractor and a good light are desirable. The gauze should be passed through the rent to begin with and the vagina subsequently filled from below downwards. The packing is removed in forty-eight hours, the vagina being swabbed for the first week, and after this douched. In all cases the patient should be nursed sitting up to promote drainage.

RUPTURE OF THE CERVIX.

CAUSES.

The cervix may rupture either spontaneously or as a result of operative interference.

The common cause of extensive rupture is operative interference, and of all the varieties of such the use of forceps before the cervix is of sufficient size to accommodate the head is by far the commonest.

Rupture may also be produced by rapid extraction of the after-coming head.

Finally, it often happens during the course of rapid artificial dilatation of the cervix, especially when this is effected by mechanical means.

When occurring spontaneously, it is nearly always the result of premature rupture of the membranes, the unyielding head being violently thrust through the partially dilated cervix by strong uterine action.

VARIETIES.

Lacerations of the cervix most commonly affect the left side, but they are often bilateral. The extent varies from a short notch to a deep split that involves the lower uterine segment and the vaginal vault.

There is a rare form of annular laceration, in which the vaginal cervix may be separated like the cap on the front of a child's head (Fig. 145).

Partial annular laceration may also occur and coexist with a vertical split.

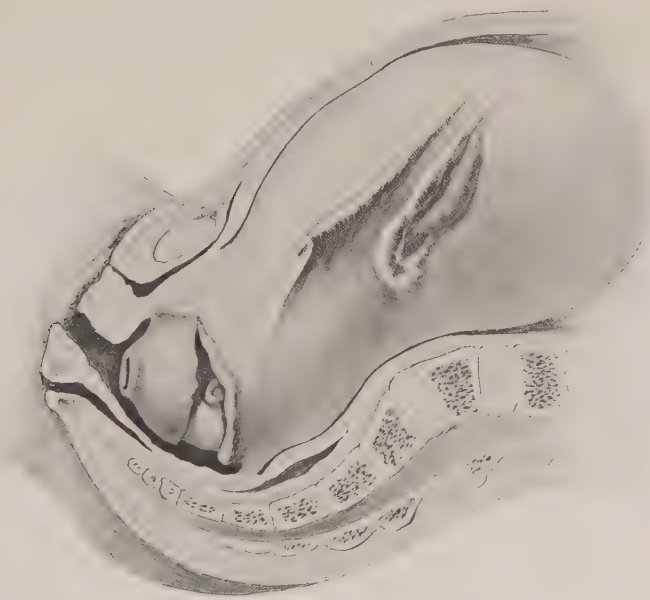


FIG. 145. Annular Rupture of the Cervix.

It is probable that slight ruptures of the cervix take place in all first labours.

SYMPTOMS.

Laceration of the cervix may produce post-partum hæmorrhage, but extensive tearing sometimes takes place without any unusual loss.

SIGNS.

It may be difficult to detect a lacerated cervix by digital examination. If from the bleeding, therefore, the practitioner suspects laceration, he should pull down the cervix with a ring forceps and inspect it.

PROGNOSIS.

Infection of a cervical laceration may be followed by acute puerperal cellulitis or endometritis, see Chapter XXV. It is probable that no cervical laceration of any depth ever unites spontaneously,

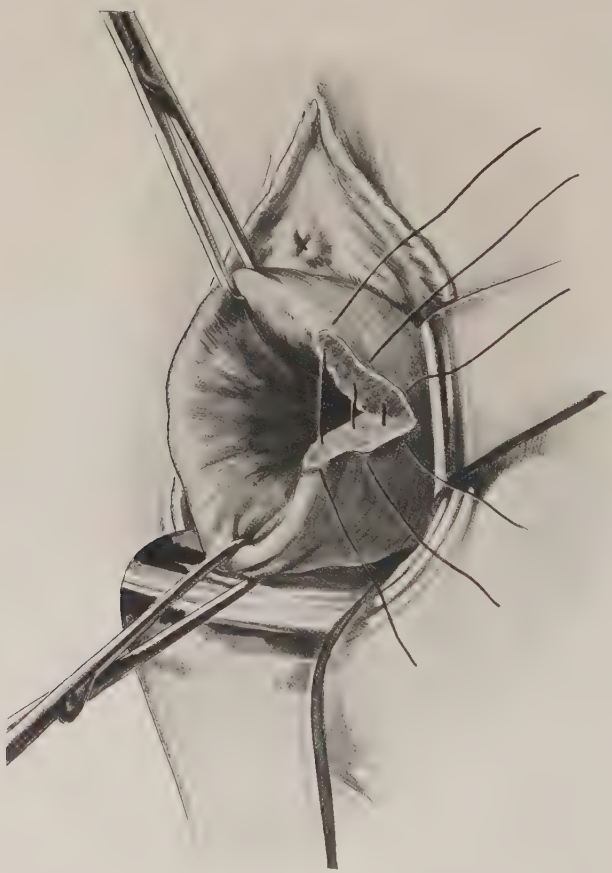


FIG. 146.—Laceration of the Cervix. Sutures *in situ*.

for the retraction of the musculature separates the edges of the rent.

The subsequent course of events varies. In some cases, and those the most favourable, the raw areas granulate and become covered by squamous epithelium, which ingrows from that covering the vaginal surface. The cervix then becomes bilipped, each lip being covered both on its inner and outer surface with a smooth, squamous epithelium. Such a cervix is associated with no ill effects.

In other cases, and those less favourable, the raw surfaces of

the laceration become covered with a short columnar epithelium, and the whole of the inner surfaces of the lips are converted into a large glandular area, called an "erosion," secreting mucus profusely (leucorrhœa). This change is the result of infection and chronic inflammation affecting the lacerated cervix and the cervical canal above the laceration. Deep cervical lacerations extending into the vaginal vault and paravaginal tissue may, when chronically inflamed, be a source of pain.

Finally, it is to be remembered that a lacerated and chronically inflamed cervix may be the antecedent of carcinoma in that situation.

TREATMENT.

The immediate repair of every cervical laceration is an ideal not practicable under present conditions. Where, however, the rupture is deep, and more particularly when it is the cause of free bleeding, it should always be sutured.

The operation requires anæsthesia, and the patient should be placed in the lithotomy position in a good light. The vagina being swabbed clear of blood, the lips of the cervix should be drawn down with ring forceps and the extent of the rent inspected. Interrupted sutures, either of fine silk or catgut, should be used, so that subsequent removal will not be necessary (Fig. 146). If the bleeding from the edges be free, mattress sutures should be used to control it. The suturing should be begun at the upper end of the laceration, and the ends of the sutures left long to act as a tractor while the lower ones are being inserted.

The strictest antiseptic precautions should, of course, be used.

RUPTURE OF THE BLADDER.

Vesico-vaginal Rupture.

CAUSE.

Spontaneous rupture is very rare; in most cases the accident occurs in the course of operative manipulations consequent on obstructed labour. The rent, as a rule, affects the upper part of the vagina, and is often an extension from a deep rupture of the cervix.

TREATMENT.

Immediate suture is imperative. The patient should be placed in the lithotomy position, the vagina well retracted, and the extent of the rent very carefully inspected. A single layer of sutures had

best be used, and silkworm gut, by reason of its non-absorptiveness, is the best material. They should pass through both vaginal and vesical surfaces, and the ends of the knot in the vagina should be left long to facilitate subsequent removal. Care must be taken not to include the ureteral orifice in the suture. The bladder should then be continuously drained for a week with a soft rubber catheter, secured in position by pieces of strapping. The vagina should be irrigated several times a day with an antiseptic solution. The sutures, if all is going well, should be removed in ten days under an anæsthetic. If, however, the wound breaks down, with symptoms of sepsis and leakage of urine, they should be removed at once, for their further presence only accentuates the inflammatory condition.

In such a case a vesico-vaginal fistula results, which will require a plastic operation for its closure at a later date. This should never be attempted until all inflammatory manifestations have ceased and the urine has become acid. The bladder should be irrigated with boric acid solution at least twice a day, the solution flowing out through the fistula, and this should be continued until the inflammation has entirely disappeared, as with cystitis present no suturing can succeed.

The presence of restrained sutures in the edges of the fistula is a potent cause in keeping up cystitis, and leads to the deposit of phosphatic concretions. It is very important, therefore, that all sutures should be removed so soon as their failure to repair the rent is recognised.

Intra-peritoneal Rupture.

CAUSE.

Intra-peritoneal rupture may occur spontaneously or as the result of over-distension from obstruction. As an example of the first, it has been noted to have happened during normal labour at the end of twelve hours. Many examples may be collected of rupture of the bladder due to obstruction principally with an incarcerated, retroverted, gravid uterus, in which case the rupture is generally preceded by sloughing of the bladder wall.

SYMPTOMS AND SIGNS.

On the occurrence of the rupture there is sudden pain, and the rapid development of symptoms of peritonitis. The passage of a catheter fails to draw off urine, or at the most a little blood is passed. On injecting a measured quantity of sterile saline solution it does not return.

TREATMENT.

Immediate abdominal section, followed by suture of the rent, is imperative. If the child is still *in utero* it should be delivered by Cæsarean section.

INJURIES TO THE INTESTINE.

The intestine has been injured by the practitioner failing to recognise the nature of a piece of bowel that has prolapsed through a rent in the uterus or vagina. Under these circumstances it has actually been torn or cut away, having been mistaken for part of the membranes. Omentum has been similarly treated.

Quite apart from such a terrible mistake, bowel which has prolapsed through a rent in the uterus is exceedingly likely to have become detached from its mesentery.

TREATMENT.

The nature of any substance felt hanging into the uterus or vagina must be absolutely ascertained before an effort is made to remove it. Further, a piece of prolapsed bowel should not be simply returned through the rent into the abdomen and the patient left *in statu quo;* the abdomen should always be opened in case detachment from the mesentery has occurred. If a piece of bowel has unfortunately been cut off, the abdomen should at once be opened and the ends united.

RUPTURE OF THE RECTUM.

Recto-vaginal Rupture.

CAUSE.

Rupture of the rectum usually results from backward extension of a rent in the perineum, see p. 460. Rarely it may occur apart from this injury, the recto-vaginal septum above the perineum being torn. In this case the injury is due either to a laceration such as may result from operative manipulation in the course of obstructed labour or to pressure of the head against the posterior vaginal wall in a very prolonged second stage.

A remarkable case is on record in which after a partial rupture of the rectal wall down to the mucosal coat, the latter, bulging into the vagina, was seized and drawn upon, with the result that *fifteen feet* of rectal and colic mucosa was stripped out, the muscular and peritoneal coats remaining intact. On opening the abdomen after death, the large intestine on inspection appeared to be intact until

opened up, when the remarkable condition mentioned was discovered.

TREATMENT.

The rent must immediately be sutured, the preparations for the operation being similar to those described under Rupture of the Bladder. Two layers of sutures should be used, a deeper continuous thread of fine silk or catgut to unite the rectal mucosa, and interrupted silkworm gut sutures for the vaginal wall. During convalescence the vagina should be irrigated with boric acid solution several times a day. Accumulation of hard scybalæ in the bowel should be avoided by early saline purgation.

Intra-peritoneal Rupture.

CAUSE.

Rupture of the rectum into the peritoneal cavity is an extremely rare event. We have met with one such, however, the circumstances of which were very unusual. In this case a dermoid cyst of intra-peritoneal origin was forced through the anterior rectal wall about 1½ inches above the floor of Douglas's pouch by the pressure of the head as it was being delivered by forceps. The pedicle being torn through, the cyst was extruded per anum. Acute peritonitis developed shortly afterwards.

TREATMENT.

Immediate abdominal section. In our case suture of the rent was impossible owing to its inaccessibility. Instead, the back of the broad ligament and the uterus were sutured to the posterior brim of the pelvis, so as to exclude Douglas's pouch from the general peritoneal cavity. The patient recovered.

RUPTURE OF THE PERINEUM.

The perineum may rupture during the course of normal or abnormal labour.

CAUSES.

Mother.—In a normal primiparous labour no amount of skill can prevent a certain degree of rupture of the vulval outlet. The tear in these cases may involve the fourchette only or extend into the perineum proper.

If the vulva is smaller than normal, the risk of rupture is much greater.

In a normal multiparous labour, ruptures are much less common,

and are almost limited to those cases in which the perineum has been repaired after a previous confinement.

Early rupture of the membranes favours a perineal rupture, inasmuch as the guiding force or general intra-uterine pressure is mostly lost and the head is driven back into the posterior vaginal wall by direct uterine action.

A contracted pelvis, by causing impaction of the head in the cavity, predisposes to rupture, especially if it is of the generally contracted type, in which case the head will commence to extend too soon before the occiput can escape under the pubic arch.

Precipitate labour may cause the perineum to tear, as it may any other part of the genital tract.

If the head is delivered during the struggling of delirium, the perineum is likely to rupture from the unavoidable lack of attention on the part of the attendant.

Child.—Malposition of the child's head may cause rupture of the perineum, and of these unreduced occipito-posterior delivery and delivery of the after-coming head are most often responsible for the injury. In rare cases where the prolapsed arm and head are born together, rupture is likely.

The shoulders are frequently responsible for extension of the tear produced by the head.

Attendant.—The attendant may be directly the cause of rupture by rough manipulations, or by not managing the birth of the child properly, since if he allows the head to extend before the occiput has slipped out clear of the symphysis pubis, the occipito-frontal diameter of $4\frac{1}{2}$ inches will distend the vulval orifice instead of that of the suboccipito bregmatic, which measures $3\frac{3}{4}$ inches.

Incomplete anæsthesia may cause rupture, since if the practitioner is not careful to "put the patient right under" before he delivers with forceps, her struggles may result in injury.

Forceps delivery, when inexpertly carried out, may cause perineal rupture either from failure to carry the head forwards at the moment of extraction, or, carrying it forwards, by allowing the back edge of the blades to cut the tense perineum.

VARIETIES.

Incomplete Rupture.—Where the rent does not involve the anal sphincter, it is incomplete. When opened out, such ruptures are more or less diamond shaped, the upper Λ involving the posterior vaginal wall and the lower V the skin of the perineum.

The upper limb of the rent may bifurcate, a fissure extending up either side of the posterior vaginal column.

Complete Rupture.—When the rent extends backwards through the anal sphincter, the rupture is complete. In degree these ruptures vary. The margin of the anus may escape, though the sphincter outside it is divided, or the rectal wall may be split for an inch or more along its anterior aspect. Sometimes an aperture into the bowel above the anus may be present although the anal margin is intact.

Central Rupture.—This is very rare, and occurs in those cases where the head is driven hard back on the recto-vaginal septum and has difficulty in extending or escaping.

The rupture commences in the vagina and extends to the perineum, a small portion of the anterior part of the perineum remaining intact. The rupture may extend into the rectum.

Concealed Rupture.—This is very commonly met with. The perineal skin remains intact, but the tissues deep to it give way, and the posterior vaginal wall is "rucked back" at the vagino-cutaneous junction. Superficial inspection reveals no rent, but on opening out the vaginal orifice a pocket is seen, bounded below by the perineal skin. Division of this converts it into an ordinary incomplete rupture.

RESULTS.

The results of a ruptured perineum may be hæmorrhage, sepsis, or loss of function.

Hæmorrhage.—This is rarely severe, but may on occasions be considerable. It is invariably controlled by the sutures used to repair the rupture.

Sepsis.—Septic infection of the rent is in its lesser degrees common. Its situation in direct communication with surfaces never sterile is the chief cause of this; moreover, the resistance of the tissues has been lowered by bruising.

The slighter degrees of inflammation are not painful and soon subside, but in severe infection profuse suppuration or even sloughing and gangrene occur.

Where hæmorrhoids have previously been present, and the rupture invades the region of the anus, they invariably become infected as well, with great swelling and severe pain.

Infection of a perineal laceration is a serious mishap for two reasons: first, because it prevents natural union, and secondly, because the organisms may by transportation or ascending growth infect the placental site.

An undiagnosed concealed rupture is likely to become septic from lack of treatment.

Loss of Function.—A deficient perineum predisposes to cystocele because the natural support of the anterior vaginal wall is withdrawn. Moreover, the natural sharp forward curve of the lower end of the vagina is lost, so that anything descending the canal is allowed to pass straight out.

Thus, a rectocele, an elongated cervix, or a prolapsed uterus are unimpeded in their course downwards.

If the anal sphincter be ruptured and remains ununited, the patient will suffer permanent loss of control over flatus at all times, and over the fæces whenever the bowels are loose.

TREATMENT.

Preventive.—The practitioner must endeavour as far as it lies in his power to secure that the head passes out of the vagina in the most favourable position, *i.e.*, well flexed and with the occiput forwards, except in the case of a face presentation, when the chin should be in front and the head fully extended.

To ensure this he should try to retard the extension of the head until the occiput has escaped under the pubic arch. When the head is "crowned" he should prevent it being delivered in the height of a pain, and as the contraction passes off he should facilitate its escape by pressure applied with his right hand in the manner shown in Fig. 147.

To deliver artificially a vertex with the occiput posterior or a face with the chin posterior is to invite severe perineal rupture.

This is one of the reasons why it is so important to rectify such malpresentations before delivering the child, see pp. 323 and 332.

In forceps extraction, extensive rupture of the perineum is almost sure to occur if the instruments at the moment of delivery are not carried well forwards towards the mother's abdomen.

The head should never be violently pulled out like a cork from a bottle. This is an accident especially liable to occur in occipito-posterior deliveries, see p. 324. On the other hand, forceps skilfully used is one of the best methods of minimising or preventing rupture, for the head can be restrained during the height of the pains, and the degree of tension on the soft parts regulated to that which it is deemed they can bear without tearing.

Before extracting the shoulders, complete rotation forward should have taken place, and the anterior shoulder should first be disengaged and the trunk subsequently guided forwards round the symphysis.

In delivering the after-coming head, there is a great tendency to fail to remember to rotate it forwards as it passes through

the outlet, for in most of these cases there is urgency to complete the birth on account of asphyxia, and in the hurry the operator may forget this important point.

Episiotomy.—Where a tense perineum is obstructing labour and it appears impossible for the head to be born without an extensive rupture, the latter may be minimised by deliberately dividing the perineum with scissors on one or both sides of the middle line. The incisions must of course be subsequently sutured (Fig. 148).

Curative.—All perineal lacerations should be immediately repaired. The operation is usually undertaken after the expulsion

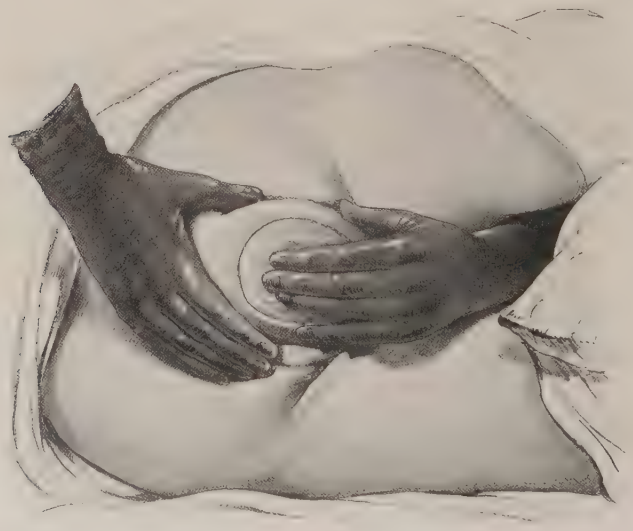


Fig. 147.—Method of Delivering the Head to prevent Rupture of the Perineum.

of the placenta, although there is a distinct advantage *if the tear is not a severe one and the uterus is well retracted* in passing the sutures directly after the child is born, and this for three reasons. First, if the patient is already anæsthetised, and the sutures are passed as suggested, she will not feel the pain. Secondly, even in the absence of an anæsthetic the parts are so numbed after the passage of the head that sutures can be passed more or less painlessly. Thirdly, if there is a tendency to post-partum hæmorrhage and the patient is intolerant of pain, to delay the passge of sutures until the placenta has been expelled (a matter of, as a rule, at least fifteen to twenty minutes) will necessitate an anæsthetic to pass them, which may favour atonicity of the uterine muscle.

The sutures should be passed but not tied, the free ends being clamped by a pair of pressure forceps until the placenta has been expressed, after which they can be knotted.

Owing to the trickling of blood it may be necessary to pass a swab into the vagina to arrest the flow for the few seconds the sutures are being passed.

If the sutures are passed before the termination of the third

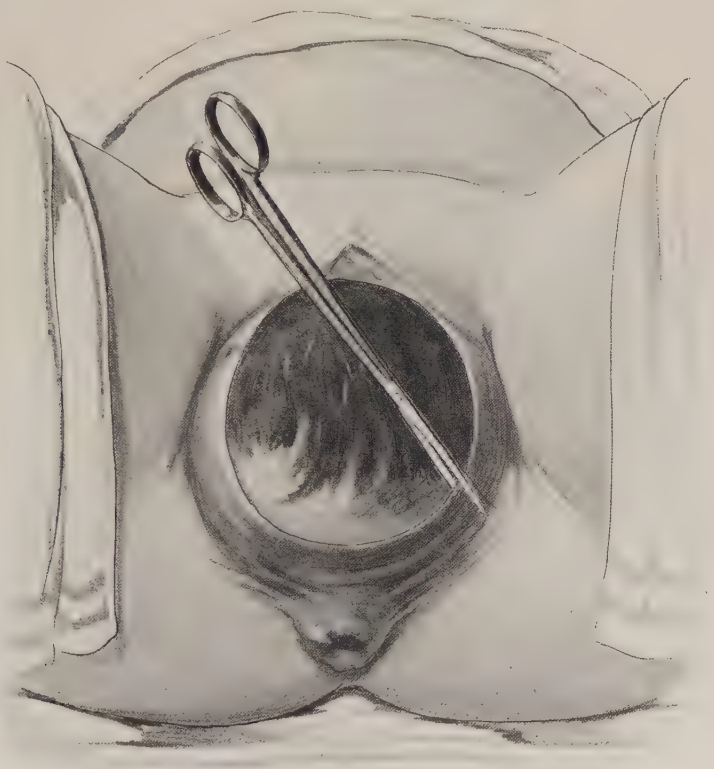


Fig. 148.—Dividing the Perineum with Scissors.

stage, the practitioner must hand the care of the uterus over to the nurse, and must be careful he does not include a piece of the membranes within his suture. The cord, of course, is held forwards away from the wound.

The slighter degrees of laceration can be sutured in the absence of an anæsthetic, but the more extensive ones cannot be satisfactorily dealt with without it.

In such cases, therefore, if anæsthesia has been employed for the

second stage, it should be lightly maintained until the placenta is delivered, and then increased sufficiently for the needs of the operation.

All incomplete ruptures can be well repaired with the patient in dorsal decubitus, especially if the buttocks are elevated on a douche bath, but tears involving the anal sphincter require the

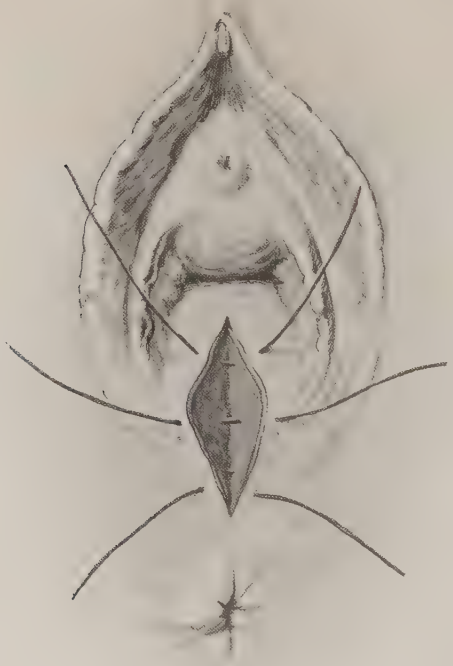


FIG. 149.—Incomplete Rupture of the Perineum. Position of Sutures.

lithotomy position for their satisfactory suture. The lateral position should never be adopted in any case.

The chief point in successful repair is to use as few sutures as possible.

Incomplete Rupture.—Incomplete ruptures rarely require more than three or four sutures, unless the rent extends an unusual distance up the vaginal wall.

Buried sutures or sutures placed in inaccessible positions

up the vagina, so that they cannot readily be removed, should be avoided if possible. Stout silkworm gut is the best material to use, because of its non-absorptive nature.

The sutures should, if possible, be passed from the skin surface, and should lie deep to the wound throughout their course. This is

Fig. 150.—Rupture of the Perineum with a two-limbed Tear of the Vaginal Wall.

not always possible, however, and care must at all times be taken not to pass them into the rectum.

In incomplete rupture the first suture to be inserted approximates the lateral angles of the diamond-shaped gap (Fig. 149).

Exceptionally in incomplete ruptures one or more fissures may run up the posterior vaginal wall for such a distance that it is impossible to close them by sutures passed through the skin. In

such an event, two or three interrupted catgut sutures should be separately applied to close the upper part of the fissure (Fig. 150).

Concealed Rupture.—Concealed ruptures should be converted into the ordinary incomplete variety by incising the intact perineal skin that forms the lower boundary of the pocket. If this is not done,

Fig. 151.—Complete Rupture of the Perineum with Asymmetrical Tearing of the Vaginal Wall.

the wound drains badly. It should then be sutured in the ordinary manner.

Complete Rupture.—In dealing with a complete rupture, it is less easy to avoid buried sutures (Fig. 151); but provided that the rent does not extend far up the anterior rectal wall, it is possible to close it by sutures passed through the skin surface alone.

If this cannot be done, catgut sutures must first be used to separately close the upper part of the tear in the rectum. These should not be passed through the mucosa of the bowel, but should

pick up the muscular coat by a Lembert stitch, so that the knot when tied lies inside the wound (Fig. 152). The remainder of the laceration is then to be repaired by silkworm gut sutures passed through the skin in the manner already explained.

FIG. 152.—Complete Rupture of the Perineum. Suture of the Rectal Wall.

Exceptionally, additional catgut sutures may be required to close the upper end of the tear in the posterior vaginal wall (Fig. 153).

Of the cutaneous sutures, the most posterior is the important one, because it approximates the ends of the torn anal sphincter. It should therefore be inserted first, and its situation chosen with great care.

During the suture of a ruptured perineum, the operator is often handicapped by blood flowing from the uterus and obscuring his view. This is prevented if, as a preliminary, he plugs the vagina

with a swab, *but he must on no account forget to remove it afterwards.*

The perineum should never be repaired until it is certain that the uterus is satisfactorily retracted, for, in the event of digital explora-

Fig. 153.—Complete Rupture of the Perineum. Position of the Final Sutures.

tion of the uterus being required, see p. 277, the sutures will probably be torn out.

The after-treatment of a ruptured perineum consists in douching the vagina at least twice a day with an antiseptic solution, and removing the cutaneous sutures on the seventh day. In complete ruptures the suture holding the sphincter may be left with advantage till the tenth day. The bowels should be opened in the usual course, and in the case of complete ruptures should be kept loose for a week afterwards by means of saline aperients.

If there is much swelling of the parts with pain, great relief is given by warm boracic fomentations. This particularly applies to complete ruptures.

If definite inflammatory signs supervene with redness, swelling and discharge, the sutures should at once be removed and the parts fomented every three hours. Before the application of each

FIG. 154.—Lacerations of the Vulva.

fomentation, the wound should be well irrigated with hydrogen peroxide (10 volumes).

In these cases, repair will be by granulation with a more or less deficient result. This process may be hastened after the inflammatory signs have subsided by dusting the raw surfaces with aristol and keeping the knees tied together.

No secondary operation should be attempted until three months

at least have elapsed, and not then unless all traces of infection have passed away.

The presence of buried sutures or sutures tied in the vagina and not removed will prolong the period of suppuration very much. It is, therefore, very important to remove all such directly it becomes apparent that the wound is not going to heal by first intention.

LACERATION OF THE VULVA.

Lacerations of the vulva are common, especially after forceps delivery. Some of these are in the nature of abrasions and do not admit of suture; others, however, are deep fissures frequently situated immediately below the clitoris (Fig. 154). Free arterial bleeding may occur from them.

TREATMENT.

Simple abrasions should be left alone; fissures, especially when bleeding, should be closed by mattress sutures.

RUPTURE OF THE RECTUS ABDOMINIS.

The rectus abdominis may rupture during labour, in which case the patient will complain of great pain and local tenderness. A swelling will be felt in the neighbourhood of the ruptured fibres, and in a short time a bruise will appear.

Rupture of this muscle has also been recorded in the sixth month of a twelfth pregnancy, and the event was accompanied by severe vomiting.

RUPTURE OF THE SYMPHYSIS PUBIS.

CAUSE.

The normal softening that occurs in the pelvic joints during pregnancy predisposes to injury of the interpubic joint, and when this softening is in excess of the normal, the chance of injury is markedly increased, as it also is if osteo-malacia is present. Occasionally the pubic joint will be strained or ruptured spontaneously in the course of a normal labour, but in most cases some additional cause is necessary to produce this injury, such as a high forceps operation, the application of forceps in the oblique diameter of the pelvis, a generally contracted pelvis, or abnormal size of the child's head. Injury to the joint may also be caused by excessive abduction of the thighs with the patient in the lithotomy position, or by a restless patient throwing her legs about.

SYMPTOMS.

The patient complains of severe pain on the slightest exertion, and has incontinence of urine if the urethra has been ruptured.

SIGNS.

A tender swelling appears over the symphysis pubis, and the patient suffers great pain on the least movement of the joint. The thighs are rotated outwards and the patient is unable to move her legs. On a bimanual examination being made, the separation of the pubic bones may be detected or crepitus may be obtained.

The vagina and urethra are at times found lacerated. The joint is not always ruptured, occasionally it is strained only, but the symptoms and signs will be the same with the exception of the separation of the bones and the crepitus.

PROGNOSIS.

Generally the patient recovers completely. Occasionally the joint becomes septic, and an abscess may form, more especially when the vagina has been lacerated.

When the pubic bones are separated either by design (symphysiotomy) or by accident, the sacro-iliac joints are also loosened, and if this is carried to excess, as sometimes happened in the early days of symphysiotomy from the excessive abduction of the thighs, the patient's power of locomotion was destroyed or much diminished, so that she became lame.

TREATMENT.

The patient must be kept strictly to bed, lying on her back until all tenderness has disappeared. Meanwhile the joint must be splinted by a strong binder securely fastened round the pelvis, which the patient should wear for some time after she gets about again.

Rarely the treatment indicated fails, and to restore the power of walking it has been found necessary to cut down on the pubic joint and wire the ends of the bones.

SUBCUTANEOUS EMPHYSEMA.

CAUSE.

This very rare complication is due either to rupture of some of the air vesicles of the lungs, induced by excessive straining during labour, which in nearly all cases has been prolonged, or it may be associated with rupture of the uterus or vagina into the broad

ligament. In the first case the emphysema is noticed in the neck, in the second case in the lower abdomen. Emphysema more frequently occurs in primigravidæ.

SYMPTOMS.

In the case of emphysema of the neck great discomfort is expressed, together with breathlessness, pain, and difficulty in swallowing.

Emphysema in the lower abdomen produces tenderness and pain in that region.

SIGNS.

If the air escapes beneath the pleura, it reaches the mediastinum, and infiltrates into the cellular tissue of the face, neck, and front of the chest, so that the tissues here are swollen, and a crackling sensation is obtained on pressure. The mucous membrane of the mouth is at times affected, and the patient may lose her voice and be restless.

Emphysema due to rupture of the uterus appears over the pubes, and produces a crackling sensation there. That due to rupture of the vagina has a similar distribution. It may follow symphysiotomy or pubiotomy if the vaginal wall has been lacerated.

TREATMENT.

If the emphysema appears before the termination of labour, this should be ended as soon as is compatible with the safety of the mother.

Emphysema of the face and neck appearing after labour may be left untreated, except that the patient may want some diffusible stimulant for the shock that is at times present.

The treatment of emphysema due to rupture of the uterus or vagina is that of the disaster itself.

INJURY TO THE SACRO-ILIAC JOINT.

Injury to this joint may result from difficult labour, especially in those cases in which after division of the pelvis the bones have been allowed to separate too widely. It has followed forceps delivery. The pain may be so severe as to produce pseudo-paralysis of the muscles of the leg and buttock, and there is much local tenderness.

TREATMENT.

The joint must be fixed by a broad belt round the pelvis. Recovery is slow, and in some cases permanent weakness results.

CHAPTER XXV.

Fever in the Puerperium.

Though there are many possible causes of fever in the puerperium, one of them, namely, septic infection of the genital tract, far outweighs all the others both in frequency and in importance.

SEPTIC INFECTION OF THE GENITAL TRACT.

The manifestations of puerperal sepsis vary widely in different cases, and in order to appreciate the reasons for this, and also to clearly understand the *rationale* of its prevention and cure, it is necessary first to grasp the processes concerned in the production of the condition.

THE NATURE OF THE LESION.—In all puerperal infection a primary lesion exists, *i.e.*, an area through which the infecting organism first obtains access to the tissues of the patient. This primary lesion may be situated either in the vulva, the vagina (including the perineum), the cervix, or the body of the uterus.

From this *primary lesion* the infection may spread by continuity of tissue to surrounding parts, producing a *consecutive lesion*, or may be transported by the blood stream to situations remote from the genital tract and establish a *metastatic lesion*.

The lesions of puerperal infection are therefore of three kinds, each of which requires separate consideration.

The Primary Lesion.

The commonest position for the primary lesion is the placental site. Here exists a natural wound fronting into a cavity, which if the cervix be closed is but poorly drained, and which always contains in the earlier days of the puerperium a certain amount of blood clot and *débris*. This wound is in direct relation with the large venous sinuses in the wall of the uterus, and thus both by reason of its position and its structure presents an area peculiarly favourable to the growth and subsequent spread of organisms implanted there. *Post-mortem* examination of patients dying of puerperal sepsis reveals the placental site in varying degrees of acute inflammatory necrosis or suppuration.

The cervix is less commonly the situation of the primary lesion.

In these cases laceration during labour has occurred and the wound is either sloughing or suppurating.

The vagina by reason of its tough resisting structure is rarely primarily implicated, but perineal and vulval wounds, on account of their superficial position, very commonly or always become infected within a short time after their production. Fortunately their very superficialness, the ease with which they drain, and their position, remote from any large tract of important lymph channels or large blood vessels, allows of inflammation to take place with a minimum risk of grave toxic or septic absorption. They form, however, a breeding ground from which organisms may ascend to the upper part of the genital canal.

Consecutive Lesions.

Starting from the primary lesion, the infection may extend by continuity of tissue in various directions.

This consecutive extension may take place in three ways :

1. By surface extension along the mucous membrane of the canal ;

2. By lymphatic conduction, either capillary or trunk, producing cellulitis and lymphangitis ; and

3. By phlebitis, resulting in thrombosis of the affected veins.

The character and situation of the consecutive lesions varies, therefore, according to the situation of the primary lesion and the method of extension from it.

In primary placental site infection it may take the form of salpingitis and peritonitis (surface extension), of broad ligament cellulitis (lymphatic extension), or of a thrombo-phlebitis of the ovarian or uterine veins (venous extension). All these consecutive lesions are common in the severer forms of puerperal sepsis, either singly or in association.

Where the primary lesion occurs in a cervical laceration, the placental site may be consecutively infected, or extension may take place along the lymphatics in the lower part of the broad ligament, producing cellulitis there.

Infected perineal lacerations may be the starting point of a thrombo-phlebitis of the recto-vaginal septum, while the liability for the organisms to infect the upper part of the genital canal by consecutive spread has already been referred to.

Metastatic Lesions.

Metastatic lesions by vascular conveyance may originate either from the primary or the consecutive lesions. They are of two kinds : toxæmic and septicæmic.

In the first case the toxins of the bacteria in the infected area are alone absorbed into the blood stream; in the second, the bacteria themselves find entrance there. In either the process originates in the capillaries, and particularly the veins of the inflamed area.

Toxic absorption occurs in every case of puerperal sepsis more or less, and the presence of soluble organic poisons dissolved in the blood plasma produces degenerative changes in the tissues of the whole body, and particularly in those highly specialised.

Thus acute cloudy swelling of the hepatic and renal cells early occurs, and similar degenerate changes are found in the heart muscle and elsewhere. Where the patient lives long enough, definite fatty or fatty-hyaline degeneration follows, and *post-mortem* the kidneys and liver are found pale and swollen.

Septic absorption is probably always due to the breaking down of infected thrombi in the veins of the area of primary or consecutive infection, whereby bacteria are launched into the blood stream. There are two degrees of this disaster. In the first and least, sporadic transmission occurs and produces a solitary metastatic lesion, such as a localised pleurisy, in spite of which the patient may recover. No organism can be isolated from the blood in these cases.

In the second and graver, the entrance of bacteria into the blood stream is overwhelming, and the organisms probably multiply therein, so that cultures or even smear preparations at once reveal their presence there. The circulating organisms set up multiple metastatic lesions all over the body, of which septic pneumonia, bilateral pleurisy, and infective endocarditis are common types.

THE BACTERIOLOGY OF PUERPERAL INFECTION.—The common causal organism in the graver forms of puerperal infection is the streptococcus.

In an investigation into the causation of puerperal infection by Victor Bonney and A. G. R. Foulerton, this organism was present in over 60 per cent. of the cases in which the uterine cavity was found to be infected.

It was associated in almost all the graver cases with the B. coli commune, the latter organism probably representing a secondary infection, for it was shown that pure B. coli infection is uncommon.

Most of these cases of mixed streptococcus and B. coli infection died. In a small proportion of cases the pneumococcus took the place of the streptococcus as the primary infection.

In the slighter forms of puerperal fever, staphylococci, either pure or in association with the colon bacillus, were isolated. In many of these cases the uterine cavity itself was found to be sterile, the

vagina and cervix alone showing bacterial growth associated with lacerations of these parts. Exceptionally other causative organisms were found, such as the gonococcus, B. pyocyaneus, bacilli of the diphtheroid group and others.

The results of the investigation referred to above are in accordance with those of other workers, and with them establish the fact that puerperal sepsis is in most cases due to the ordinary organisms of sepsis as they occur in other parts of the body.

The classification of puerperal fevers into two groups, the septicæmic and sapræmic, is not supported by evidence. The term "sapræmic" was applied on the assumption that the decomposition of material retained in the uterus by putrefactive but not parasitic organisms gave rise to toxic products, which were absorbed by the tissues without the latter themselves being infected. This is now shown not to be the case. Whilst the local signs of puerperal infection are due to the lesions present, the general symptoms are caused by the toxic absorption which is constantly operative, and which varies in its degree according to the extent and severity of the lesions and the nature of the infecting organisms.

Metastatic lesions are the gravest, because they imply a generalised blood infection and an enormous area over which toxic absorption is going on. Consecutive lesions are less fatal, whilst a case which presents symptoms apparently solely due to the primary lesion is the most hopeful of all.

Method of Infection.—Puerperal infection may be autogenetic or heterogenetic, *i.e.*, the organism may have been resident in the patient before the confinement, or may have been introduced from without during its course or afterwards.

In regard to autogenetic infection, the bacteriology of the genital tract in the normal puerperium has been investigated by many workers, with results as regards the germ content of the uterine cavity of a very conflicting kind. Thus some investigators have found organisms in the uterus in a large proportion of normal puerperal women, whilst others have found it almost always sterile under these circumstances.

It is noteworthy that the greater the precautions taken to ensure a sample of the uterine contents uncontaminated by cervical or vaginal secretion, the less frequently have organisms been isolated from the uterus. The investigations of Bonney and Foulerton, which were carried out with special precautions of this kind, showed that the interior of the normal puerperal uterus was sterile in all cases.

Researches into the bacterial content of the normal puerperal

vagina also show divergent results, some observers having found streptococci there in as many as 15 per cent. of the cases examined. Bonney and Foulerton found that the colon bacillus and staphylococcus albus are frequently present therein, but failed to isolate any organism of greater virulency in the normal cases examined.

These findings have been confirmed by other investigators, and Whitridge Williams has specially pointed out that the presence of streptococci in the culture tubes taken from such cases is due to insufficient care having been taken to exclude vulval contamination. Under abnormal circumstances other organisms may, of course, exist there, notably the gonococcus.

As regards the bacteriology of the vulva, all observers agree that streptococci are not infrequently found there under apparently normal circumstances, while B. coli and staphylococcus albus can constantly be isolated therefrom.

The position may thus be summed up. The normal puerperal uterus is sterile. The normal puerperal vagina (and probably the cervical canal as well) contains staphylococcus albus and B. coli commune, but no other organisms of greater virulence.

In about 10 per cent. of normal puerperal women the vulva contains streptococci. Under abnormal conditions the vaginal cervix and vagina may contain organisms of potential virulence, namely, streptococcus, pneumococcus, staphylococcus aureus or the gonococcus.

Bacteria, therefore, capable of giving rise to symptoms of more or less severity exist in the genital tract of all puerperal women, and in regard to wounds of the cervix, vagina and vulva the greatest care on the part of the attendant will not always suffice to prevent infection. The uterine cavity, however, the most serious site of infection, is normally sterile, and organisms present there must either have been carried by hands or instruments passed up the vagina, or must have made their way there by ascending growth. It is only in the second of these two happenings that the infection of the uterine cavity can be strictly styled autogenetic.

There is, however, a further method of bacterial infection of the puerperal genital tract which must be taken into account, namely, the migration of organisms to it from the adjacent large intestine. The liability of the intestinal organisms to pass from the bowel to damaged tissue in its neighbourhood is well known.

For this reason prolonged labour, associated with bruising and partial devitalisation of the soft parts, is liable to be followed by puerperal sepsis, even when the labour has been conducted with great antiseptic precautions.

The more severe forms of puerperal fever are, however, as a rule heterogenetic in origin, for though, as has just been shown, bacteria of potential pathogenicity are present in the genital tract to a greater or lesser extent in all women, yet their virulence is low, and a degree of immunity doubtless exists in all individuals to the organisms habitually parasitic upon them. The virulence of pathogenic bacteria is rapidly lost unless they are frequently recultured upon a suitable medium; while, on the other hand, it is exalted by successive transference from individual to individual. The worst examples of puerperal sepsis, therefore, are those seen in the progress of an epidemic of these cases, such as, unfortunately, still sometimes occurs in the practice of medical men and especially midwives.

Whether arrived there by manipulation or migration, the growth of organisms in the cavity of the uterus is greatly facilitated if it contains unexpelled portions of secundines or blood clot, for these furnish a nidus wherein the bacteria may multiply, undeterred by the cells and fluids of the living tissues. Moreover, the relaxed state of the uterus leaves pervious many venous and lymphatic channels that would otherwise be closed, so that, infection occurring, the process more easily spreads to the deeper planes of the uterine wall, and from thence to the tissues outside it.

THE PREVENTION OF PUERPERAL SEPSIS.—Although death or severe illness from puerperal sepsis are rare in well-organised lying-in hospitals, yet these disasters are still not infrequently met with after home-conducted labour.

The reproach of the continued existence of a largely preventible disease lies, however, not only on the medical and nursing professions, but on the public at large.

The horribly insanitary houses and the utter want of ordinary cleanliness in the midst of which labours are every day taking place is a scandal to the community. Education in the general advantage and safety of cleanliness is urgently required, and some means should be sought to teach young women its special importance in childbirth.

It is, however, no use teaching the cult of cleanliness to persons whose environment and means render its practice impossible, Stricter supervision of lodging-houses and tenements is required. There still exist in all great cities thousands of houses which are unfit for the habitation of human beings. The means of cleanliness should be at the service of the poorest, and a hot-water service supplied by generators under the care and charge of the municipality should be in every dwelling.

Finally, payment of the accoucheur on a scale commensurate with the importance of the event and the knowledge, time, and appliances required of him for its proper conduction may be justly urged.

There is no branch of medicine so poorly paid as obstetrics, there is none of greater importance; in no other capacity does the doctor's success bring so little praise or failure so much obloquy. The precautions necessary for the modern ideal conduct of labour are those of a general surgical operation. The skill required when difficulty arises is quite as great, the time demanded much greater. The obligation of the public to pay a fair price for these necessities for safe labour is not less than that of the medical man to give them.

The duty of the doctor in regard to the prevention of puerperal sepsis is clearly indicated from a consideration of the established facts concerning its causation, which have been epitomised above, and it may be thus set forth:

1. To ensure sterility of his hands and appliances.
2. To sterilise, as far as may be possible, the lower part of the genital tract.
3. To avoid, as far as may be possible, the transference of organisms from the lower to the upper part of the genital tract.
4. To resterilise the genital tract, as far as may be possible, whenever such transference may reasonably be supposed to have occurred.
5. To leave the uterus empty and well retracted, and to promote free drainage from the vagina afterwards.
6. To prevent the bruising and devitalisation of the soft parts due to prolonged pressure during labour.

Sterilisation of the Hands and Instruments.—Perfect sterilisation of the hands is not only an impossibility, but the attempt to carry it out by prolonged soaking in strong chemical solutions defeats its own end by making the skin rough.

Rough scaly skin is particularly to be avoided, for dirt very readily adheres to it, whilst the loosened epidermal scales become detached, and form potential carriers of infection.

For this reason alone the use of sterilised rubber gloves in the conduct of labour is strongly to be insisted on. Their employment, of course, does not absolve the attendant from the duty of rendering his hands as aseptic as may be possible in consonance with the integrity of the skin, but it obviates the necessity of employing antiseptic solutions of such strength that their continued use makes the hands rough.

But there are other advantages to be gained from the wearing of gloves no less important. They protect the hands from contami-

nation by pathogenic organisms. Although the skin of the hands is never sterile, yet the organisms found there are normally of low virulence. The careless touching of a surface known to contain virulent bacteria infects the hand with these organisms, which may continue to reside in the skin for a long time. The practitioner who habitually uses gloves in all the manipulations of his daily practice likely to be associated with the risk of septic contamination, such as the dressing of wounds, making vaginal and rectal examinations, etc., may reasonably be supposed to have comparatively aseptic though not sterile hands.

Further, the use of gloves protects the reputation of the doctor, and gives confidence to the patient. In these days the public has a general knowledge of the infective nature of inflammation, and is quick to appreciate attempts to prevent it. Should sepsis unfortunately follow a labour, the practitioner who has worn gloves is much less likely to incur odium than he who has not, whilst, be this as it may, his own conscience will at least be satisfied that he had taken the utmost precautions known to science at the present day to prevent it. It has been objected to their use that they spoil the sense of touch, but this is purely a matter which practice will quickly overcome.

Instruments and all appliances made of glass or rubber are readily sterilised by boiling, and a steriliser should form part of the equipment of every midwifery bag. The lining of the bag should be removable and capable of being boiled, whilst all other articles, such as waterproof aprons, etc., which it is not desirable to treat so, may be washed with carbolic or formalin solution.

As regards antiseptic solutions, the biniodide of mercury is the best for general purposes. To a bowl of it (1 in 1,000) the rubber gloves should be transferred after they have been boiled, and they should be put on filled with a weaker solution (1 in 4,000).

During the progress of the case the gloved hands should be frequently washed in the solution to maintain their sterility, whilst the external genitals and anal region of the patient should be carefully swabbed prior to every introduction of the finger or hand into the vagina.

Sterilisation of the Lower Genital Tract.—Patients should be strongly impressed with the necessity of keeping the external genitals well washed with soap and water at least twice a day for some weeks before delivery is expected. As regards the preparation at the actual time of labour, there can be no doubt that a thorough surgical procedure, including shaving of the pubic hair, would be the ideal. This, however, is a counsel of perfection, and in most

cases something less will be attained. The nurse must be instructed to well wash the parts with soap and water, and then to thoroughly swab them with whatever antiseptic solution has been chosen for use during the labour. Special attention should be paid to the anal region and the pubic hair, which may be cut short where it approaches the vaginal outlet.

The use of a vaginal douche at the onset of labour is not to be recommended as a routine, since it has been shown that the germ content of the normal vagina is not markedly septic. After every examination or the introduction of the hand or instruments the canal should be swabbed out with pieces of wool mounted on a forceps soaked in the antiseptic solution, whilst every labour should be terminated by a thorough irrigation of the vagina.

Avoidance of Transferring Organisms from the Lower Genital Tract.—The transference of organisms from the vulva to the upper part of the vagina is to be avoided:

1. By sterilising the vulva as thoroughly as possible before introducing. anything into the vagina; and

2. By limiting such introduction to that which is absolutely necessary.

In regard to the first of these, enough has already been said (*vide supra*). As concerns the second, no unnecessary vaginal examination should be made. Where all is going well a single investigation immediately after the rupture of the membranes will suffice, remembering that every introduction into the vagina is accompanied by a definite risk of infecting that canal with pathogenic organisms. To avoid this risk it has been advised to use the rectum for routine examination instead of the vagina. Conveyance of organisms into the previously sterile uterine cavity is still more to be avoided. If it is borne in mind that the vagina always contains bacteria, and that it is impossible to pass anything into the uterus *viâ* the vagina without infecting the cavity of the former, it will be seen that the only way of preventing this would be never to pass anything into the uterus. In many cases of difficult labour this is impossible, and in them the obstetrician has no alternative but to carry out manipulations which he knows must implant organisms (not necessarily septic, of course) in the previously sterile uterine cavity. The solution of this difficulty, as far as may be, is discussed under the next heading.

Resterilisation of the Genital Tract after Probable Infection.—The propriety of swabbing out the vagina after the passage into it of hands or instruments possibly contaminated with vulval

organisms has already been insisted on, as has the routine use of a vaginal douche at the conclusion of the labour.

It is most important to realise that the passage of a single finger or the blade of a forceps into the uterine cavity surely destroys its sterility.

It is true that the chance of virulent organisms being thus conveyed is not great, whilst even in that event the natural resisting powers of the tissues may render the occurrence harmless, but nevertheless a certain risk is always run. This risk, as has been pointed out, cannot be avoided in some abnormal labours, and it is therefore obvious that where it has been necessary to introduce the hand or instruments into the uterus, the cavity should be thoroughly washed out with an antiseptic solution immediately after the close of the third stage. This is the more easily done because the modern conduct of difficult labour requires a general anæsthetic which should be prolonged for the purpose.

An Empty Uterus and Free Vaginal Drainage.—The increased facilities for the growth of organisms offered by retained blood clot, or portions of the placenta or membranes, has been referred to.

In addition, the deficient retraction of the uterine wall which such retention gives rise to leaves the uterine sinuses open or merely plugged with soft clot, instead of their channels being obliterated by the retracting muscle fibres.

The importance of obtaining complete evacuation of the cavity and firm retraction of the wall of the uterus is therefore obvious. The natural process of the birth of the placenta should not be interfered with without cause. It is certain that the practice of expressing the placenta from the uterine cavity before the normal mechanism of separation has had time to operate is likely to lead to retention of fragments of that structure or of the chorion. Where the placenta is still in the uterus, at least half an hour should be allowed to elapse before attempting to express it.

After the birth of the placenta it is important to maintain hold of the fundus until firm retraction seems assured.

The use of ergot to promote retraction where the obstetrician is satisfied that the placenta and membranes have been delivered entire has much to recommend it, but its administration where clot or portions of secundines are retained in the uterus is apt by the temporary cessation of the bleeding which it may effect to obscure the fact that the uterus is not empty.

A study of a number of cases of puerperal fever shows that in a large proportion of them post-partum hæmorrhage of varying degree has occurred.

In all cases of abnormal bleeding after the delivery of the placenta the uterine cavity should be at once explored with the gloved hand, when a mass of clot will invariably be found there.

The practice of treating post-partum hæmorrhage from the uterus by hot douching, ergot and compression, but without exploring the uterus, is a very bad one, because, although it may succeed in stopping the bleeding more or less, clot is left retained in the uterine cavity.

The uterus having been explored and emptied, a hot intra-uterine douche should be immediately given, after which it should be grasped from the abdomen till such time as the muscle has permanently retracted. This is properly accelerated by the hypodermic administration of ergotin.

If this practice is followed, bimanual compression or plugging the cavity with gauze will never be required.

Free drainage from the vagina is also an important factor operating against puerperal sepsis, and in this connection it may be remarked that the prolonged maintenance of dorsal decubitus favours the accumulation of a puddle of lochia in the upper part of the vagina which forms an admirable culture medium for organisms.

Amongst primitive races the puerperal woman resumes her usual avocations within a day or two of labour, and the standing and sitting posture involved promotes the free escape of the lochia from the vagina.

Amongst civilised women this practice is for many reasons not expedient, but we are of opinion that after all ordinary labours the patient should be allowed to sit up in bed next day and get up as soon as she wishes, provided that the temperature is normal.

This shortening of the puerperium has been lately strongly recommended by Haultain.

The removal of lochial discharge from the vagina is hastened by the practice of vaginal douching, a practice which we strongly advocate whenever a trained nurse is available to carry it out.

The rapidity with which hæmorrhagic discharge becomes offensive is well known. Thus the menstrual loss is often more or less foul smelling, especially when excessive, as is hæmorrhage from the mouth or nose when long continued. In these instances antiseptic irrigation is practised as a matter of course.

The frequency with which the lochia becomes offensive without any febrile symptoms is a matter of common experience. The practice of vaginal douching after labour is not only to be recommended on the score of ordinary cleanliness, by which it appeals to all refined women, but is peculiarly reasonable in view of the

length of time that the civilised puerperal woman remains recumbent, a position in which the free drainage from the vagina is interfered with.

The objection has been urged against it that organisms may be carried up into the vagina from the vulva, and from thence may make their way to the uterus. That organisms might be so transported to the upper part of the vagina, and even maintained there in spite of the douche solution used, is indeed possible, but the risks are as nothing to those associated with a culture medium carefully prepared by lochial retention at the top of a cavity (vagina) normally containing organisms and in juxtaposition to one (rectum) swarming with them.

The Prevention of Injury to the Soft Parts.—Finally, we come to the part played by injury to the soft parts in the production of puerperal sepsis.

Such injuries are the result either of tearing or bruising, or of both combined. Lacerations acutely produced and not associated with bruising and devitalisation of the tissues in their neighbourhood are the least serious from the point of view of future sepsis. They produce a wound capable of being infected, and open up lymph and blood channels, along which that infection may extend, but insomuch as the tissues bounding them are healthy, organisms implanted on them may fail to produce more than a local reaction. Wounds like this if properly sutured with antiseptic precautions usually unite at once. It is on this knowledge that the practice of deliberate incision of the perineum in front of the head is founded, and such other operative procedures as multiple incision of the cervix or vaginal hysterotomy (vaginal Cæsarean section).

Bruising by prolonged pressure is a much greater incentive to infection, because the vigour of the tissues being much lessened, organisms, finding entrance there, readily overpower them. Moreover, as has been pointed out, tissue partly devitalised and the seat of blood extravasation from continued trauma appear to exercise a chemiotactic influence to bacteria, so that though originally sterile, there is a strong tendency for migratory infection to occur.

The worst type of injuries are those combining a breach of surface with tissue bruising, for then not only is the local resistance much lowered, but a direct route for organisms to the damaged area is present as well. Some laceration of the soft parts, particularly of the perineum, is impossible to prevent in first labours. Such wounds should, of course, be immediately sewn up wherever possible.

Many, however, are of the nature of superficial abrasions about the vaginal outlet and are impossible to suture. The surfaces of

such abrasions probably always become infected more or less, and it is in these cases that routine vaginal and vulval irrigation is particularly desirable.

In difficult delivery, again, some tearing of the soft parts is frequently unavoidable, but it should be minimised as much as possible. Thus the risk of dragging the head through a partially dilated cervix is obviated by the previous use of de Ribes' bag, whilst timely craniotomy is to be chosen in preference to a forceps delivery requiring prolonged effort and much force.

Prolonged pressure on the soft parts is most of all to be avoided, and there is less risk of subsequent sepsis from rapid instrumental extraction even with laceration than from the devitalisation by bruising caused by prolonged natural delivery.

In conclusion of the subject of the prevention of puerperal sepsis, we would emphasise the importance of treating a case of difficult labour like any other surgical operation.

It is not the normal case entirely left to nature that commonly "goes septic," neither is it that where artificial delivery has been effected with the full precautions of modern surgery, but it is that in which a certain amount of interference has been carelessly and unsurgically practised.

THE CURATIVE TREATMENT OF PUERPERAL SEPSIS.—In the curative treatment of puerperal sepsis early recognition of the disaster is extremely important.

The symptoms may supervene at any time during the first fortnight, and occasionally after an even longer period.

The most severe cases declare themselves a few hours after labour, but the larger proportion begin to show definite symptoms from the third to the fifth day. Even in these, however, or in those that do not start till the second week, an inspection of the temperature chart will show, as a rule, that slight fever has been irregularly present since the confinement.

Though it is possible that emotional disturbance, constipation or painful swelling of the breasts *may* produce a rise of temperature, yet by far the commonest cause of fever in the puerperium is toxic absorption from the genital tract. In view of the importance of the early treatment of puerperal sepsis all rises of temperature in the puerperium should be accounted as due to this cause, unless good proof to the contrary is forthcoming. A temperature of 100° F., if it has existed for twenty-four hours, should be considered as an indication to act. A temperature of 101° F. or over should be regarded as an immediate indication. The prognosis of puerperal fever bears a definite relation to the period

at which active treatment is first begun; cases vigorously dealt with at the very onset of the symptoms usually recover, but where valuable time has been lost before the true nature of the trouble was borne into the mind of the obstetrician the mortality is considerable.

There is a natural tendency on the part of the attendant to hope that the symptoms are due to a lesser cause, and to find some other explanation for them, the wish being the father of the thought. It is thus that one frequently sees several days wasted, on the assumption that the fever is due to influenza or painful breasts, and so on, when an unbiassed observer at once recognises the symptoms of puerperal infection.

The symptoms of puerperal sepsis vary immensely in different cases, the only feature absolutely common to them all being the presence of fever.

The character of this varies. Thus it may be high and abrupt from the first, or the acute rise may be preceded by an irregular pyrexia of lower grade for a day or two. In the so-called "sapræmic" cases it is moderate throughout, never rising above 101° F. Very exceptionally the period immediately before death is marked by a subnormal temperature.

Changes in the lochial discharge are commonly but not always present. Under any circumstances they rarely supervene until the fever has lasted a day or two, and the same remark applies to tenderness of the uterus, pain over the lower abdomen and rigors. It should be the aim of the obstetrician not to delay a working diagnosis until these obvious signs of infection are present, for it is better unnecessarily to treat a patient as for puerperal infection than to postpone remedial measures until the case becomes obvious to the least trained intelligence but too far advanced to be saved.

With these general remarks we may now pass on to consider in detail and criticise the means at our disposal for combatting the disease.

Uterine Exploration.—The first thing to do in an early case of puerperal sepsis is to explore the uterus under anæsthesia.

The only exception to this rule is where it is reasonably certain that the uterus is not involved in the septic process. It is not often that one can be certain of this; but where an obviously infected lesion exists lower down, as, for instance, a suppurating perineal laceration or an acutely inflamed pile, the uterus being at the same time firm, painless and normally involuted and the lochial discharge to all appearance normal, it is justifiable to first try what treatment of the obvious lesion will do. In such a case the perineal

sutures must be removed, the vagina should be irrigated several times a day, and antiseptic fomentations must be applied every few hours to the perineal and anal regions.

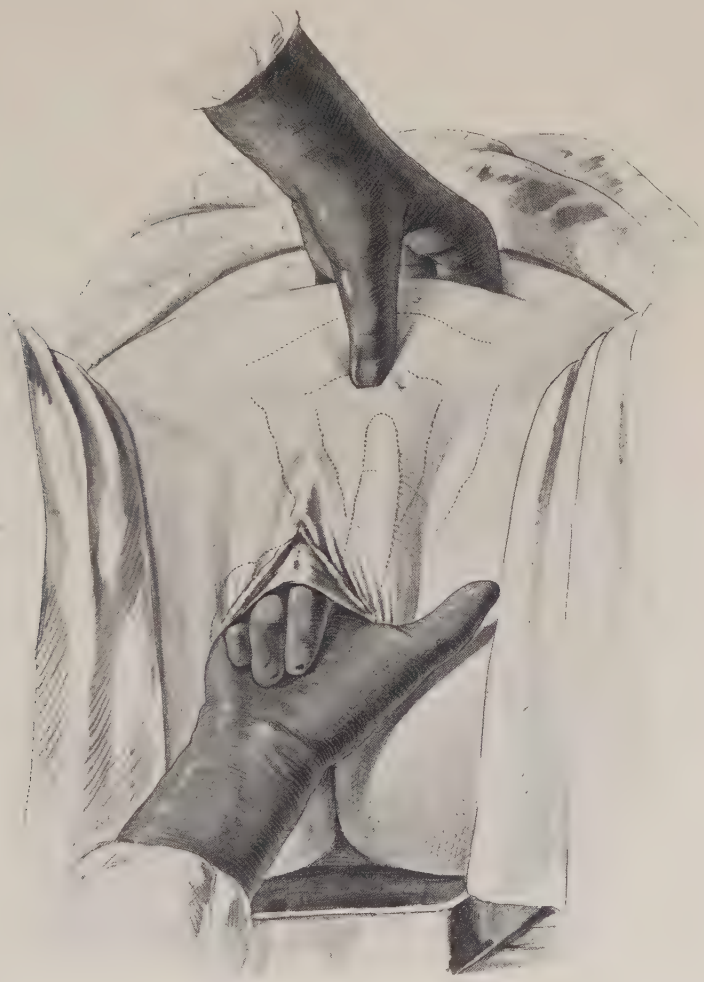


Fig. 155.—Introducing the Finger into the Uterus.

In many cases, however, we have no sure means of ascertaining whether the uterus is or is not infected, and it is better, therefore, to treat all such on the assumption that they belong to the graver category.

No harm, in our experience, has ever followed uterine exploration properly carried out, but irreparable ill may result from delay.

The patient should lie on her back in the long axis of the bed. It is a mistake to place her on her side or in the lithotomy position, because in either of these it is much more tiring to make strong pressure on her abdomen. This strong pressure is a necessity to force the uterus on to the exploring fingers, for without it the longest fingers are unable to reach the top of the cavity.

It is an advantage to place her on a bed-pan, or, better still, a douche-bath, so as to avoid wetting the bed, and it is convenient for the operator to sit on the right edge of the bed facing the patient while carrying out the operation.

The whole of the gloved right hand without the thumb (unless there is room for it) is inserted into the vagina and the first finger and subsequently the second is passed up the cervix into the cavity (Fig. 155).

To efficiently explore the uterus and certainly to remove anything from its cavity two fingers are a necessity. It often happens that at first the cervix feels too small to admit of more than one finger, but after a few minutes it will be found that a second can be invariably introduced. The uterus is firmly pressed down by the hand on the abdomen, and it is now that the advantage of the position we have described is felt, since it permits of the operator's weight being used instead of having to rely on muscle effort only.

The whole surface of the uterine cavity is carefully explored, particularly the placental site, which is roughly scraped by the gloved finger-nails. Small shreds and fragments of decidua, blood clot or placental tissue can always be extracted from any recently delivered uterus. At times the search is rewarded by the finding of larger masses (Fig. 156).

By a movement of the fingers in the cavity the fragments are passed through the cervix into the palm of the hand in the vagina. When the evacuation is complete, the fingers are withdrawn through the cervix and the intra-uterine douche tube is passed into the uterus, which is then washed out with 2 or 3 quarts of biniodide of mercury solution (1 in 1,000) at a temperature of 120° F. (Fig. 157). The tube being withdrawn, and all fluid having been squeezed out of the uterus, the external genitals are cleaned up, the soiled linen and douche-bath are removed, and the patient is allowed to come round from the anæsthetic.

The effects of this operation when performed early are, as a rule, most satisfactory. In many cases an immediate fall of the temperature to normal is the result, whilst in others a less rapid, but steady, improvement follows.

In some cases the operation is followed by an abrupt rise of

temperature, ushered in by a severe rigor. The thermometer may register as high as 105° F., and the appearance of the patient is alarming. This sudden rise of temperature following the irrigation of a septic cavity is seen after similar procedures in other parts of

FIG. 156.—Scraping the Uterus with the Fingers.

the body, such as washing out the bladder for cystitis, or the pleural space after drainage of an empyema.

The occurrence, though disconcerting, is not usually serious, for the rise of temperature is merely temporary, and is followed in most instances by a rapid fall. The possibility of its occurrence should, however, be mentioned to those in attendance on the patient.

The reason for the good effects of uterine exploration are not entirely clear, for it is certain that the operation leaves *in situ* such organisms as have already invaded the uterine wall. A certain number of the organisms are, however, removed, together with

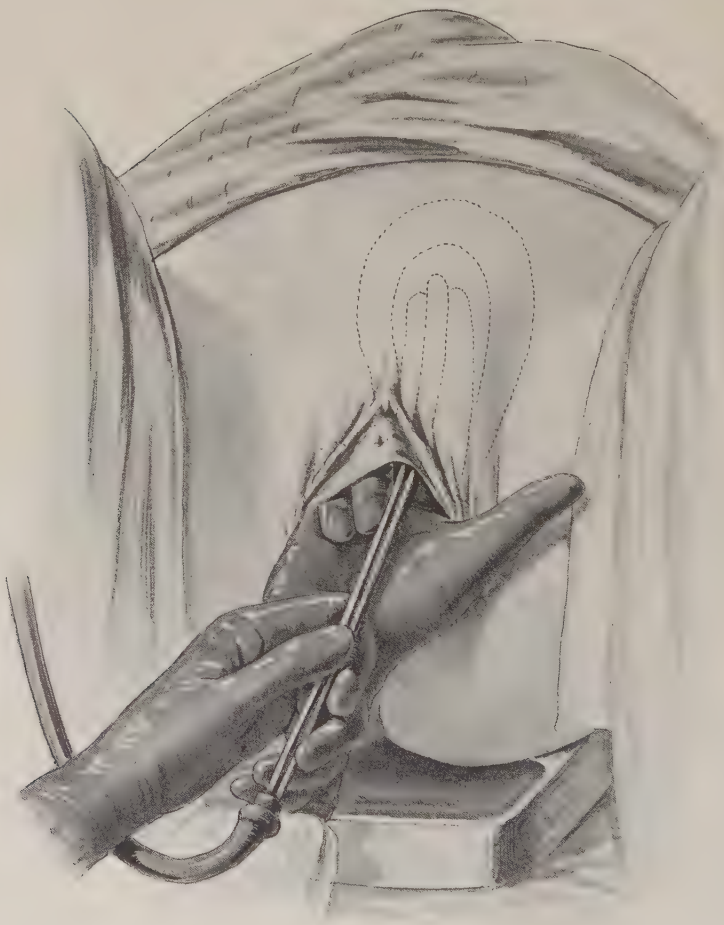


FIG. 157.—Irrigation of the Uterus.

fragments of placenta, decidua and blood clot capable of forming an inert culture medium. In addition, the drainage from the cavity is improved by the dilatation of the cervix, whilst the manipulation and hot douching increases the tone of the uterine wall.

Curettage of the Uterus.—The good results of uterine exploration are the more marked the earlier the case is taken in hand, but

in patients who come under treatment when the disease is well established, it often fails altogether. As has been pointed out, the proceeding does not remove organisms that have already deeply invaded the uterine wall. In order to eradicate these curettage of the uterus is advocated by some authorities.

Curettage to be successful must obviously be very thoroughly performed, for nothing short of the complete erasion of the infected tissue could attain this end.

The majority of obstetricians, amongst whom the authors are numbered, are not in favour of the practice, holding that complete removal of the infected tissue is impossible, whilst in the attempt many blood and lymph vessels are opened up, and form potential channels for the further spread of infection.

The septic area in the uterine wall is bounded in the more favourable cases by a zone of tissue infiltrated with leucocytes, whilst the veins proceeding from that area are thrombosed. These two factors tend to limit the process, and it is urged by those opposed to curettage that the operation tends to destroy this protective mechanism.

Those who practise it in preference to simple digital exploration point out the inefficient nature of the latter operation as far as concerns the actual removal of the infecting organisms. It is, however, doubtful if curettage ever really effects this in the sense of leaving a relatively sterile uterus at the conclusion of the proceeding, whilst the danger of breaking down protective thrombi and of opening up non-infected areas is very considerable.

There are those who would reserve curettage for cases in which simple exploration has failed, or the patient has come under treatment so late as to make it unlikely that the latter operation will succeed. We are of opinion, however, that most of these late cases are better not operated upon, and that if exploration has failed, curettage is not only very unlikely to succeed, but may be followed by symptoms of increased severity.

If the operation is performed, it must be very thoroughly carried out. A general anæsthetic is usually required; but where the patient's condition is very grave, analgesia by means of morphine and alcohol, as recommended by Japp Sinclair, may be tried. A very large sharp curette is required (a blunt instrument does no more than the fingers), and the whole of the surface of the cavity of the uterus must be gone over carefully until a complete denudation has been effected. A good deal of bleeding follows. After the curettage the cavity is very thoroughly swabbed over with some strong antiseptic, such as tincture of iodine, pure izal, lysol, or

cyllin, and is then packed with antiseptic gauze for twenty-four hours.

The proceeding, of course, necessitates much more skill than simple exploration, and the lithotomy position is required. The uterus should always be explored with the finger before proceeding to use the curette.

We are of opinion that in early cases exploration is always to be preferred to curettage, whilst in late cases, as a rule, no operation is indicated.

There are, no doubt, certain conditions in which the operation would be performed with success, but it is difficult to select them clinically.

Salpingectomy and Abdominal Drainage. — Active puerperal peritonitis is less common than passive peritoneal intoxication. In the former the classical signs and symptoms of peritonitis are present, and in some cases a definite inflammatory tumour can be felt in the lower abdomen and pelvis. Puerperal peritonitis is secondary to puerperal infection of the tubes, and if the abdomen be opened the latter are found scarlet and swollen, and exuding a thin pus from their cœlomic ostia.

The condition of the peritoneum varies. It may be merely infected without adhesions, or collections of pus may exist between the coils of intestine.

More commonly no active inflammatory phenomena are present; the peritoneum is either normal in appearance or dull and greyish, with ecchymosed patches here and there. In the various pockets, and especially in the pelvis, a blood-stained fluid is found which microscopical examination proves to contain vast quantities of organisms, usually streptococci. These cases are examples of infection without inflammation, for so overwhelming and virulent is the bacterial onslaught that the tissues are overpowered before they have time to react.

In many no suspicions of peritoneal involvement may have been aroused. There is neither pain nor tenderness, though some distension is usually present.

Puerperal peritonitis is nearly always fatal, passive peritoneal infection probably always so.

Where the peritoneum is involved in the septic process, removal of the tubes and free drainage of the peritoneal cavity is indicated. The patients usually take ether or chloroform quite satisfactorily.

The skin having been cleaned up, a median subumbilical incision is made, and the uterus and appendages are exposed and examined. Where the tubes are exuding pus through open abdominal ostia

they should be ligatured by a simple encircling ligature as far from their free end as possible, and the distal portion cut off.

Exceptionally the pus is retained in the tube, the abdominal ostium having become occluded. In these cases they should be removed up to their junction with the uterine cornua.

The tubes having been removed, the pelvis is drained by a large tube passed through the abdominal incision, and if the condition appears to warrant it, additional openings may be made over the iliac fossæ and the loin pouches.

Some surgeons also make an opening into the vagina at the bottom of the utero-rectal pouch and insert a tube through it, but it is questionable if this method has any advantages over abdominal drainage, while the opening is much more difficult to keep open, and a tube there not so easy to deal with.

Resection of the tubes and drainage of the peritoneal cavity is occasionally performed with success, especially if combined with continuous saline injection into the cellular tissue. Seeing that almost all cases of peritoneal infection die if left untreated, even a small percentage of successes justifies the operation, see p. 689.

Drainage of the Pelvis by Vaginal Incision. — Instead of opening the abdomen in these cases, the peritoneal cavity may be drained through an incision in the posterior vaginal vault. The patient having been placed in the lithotomy position, the cervix is pulled down and the posterior fornix is incised with a scalpel until the utero-rectal pouch is opened. This is then mopped out with swabs mounted on forceps, and a large drainage tube is inserted.

This operation may be combined with exploration or curettage of the uterus under the same anæsthesia.

Certain Continental authorities practise plugging of both the uterine cavity and the utero-rectal pouch with iodoform gauze after the operations mentioned have been carried out. The gauze used for the uterus should contain 10 per cent. of iodoform, that for the utero-rectal pouch 5 per cent. The former is removed in three days, the latter in seven days. This treatment has been well spoken of, but we have no personal experience of it.

Hysterectomy.—The removal of the uterus for puerperal and post-abortional sepsis has been carried out many times. Christiana collected 137 cases with a general mortality of 63 per cent. When performed for puerperal septicæmia the mortality was 75 per cent., but post-abortional cases only showed a death rate of 46 per cent.

The largest percentage of successes was obtained where the operation was done for such conditions as sloughing myomata or rupture of the uterus.

As the general mortality of puerperal fever is not more than 20 per cent., and in the worst cases not more than 50 per cent., it is obvious that the operation in question is, in the majority of cases, to be condemned.

Its ill-results are explained by a consideration of the pathology of the condition. If the mischief of puerperal infection were solely confined to the primary lesion in the uterus, the extirpation of that organ would be a rational method of cure. It has been shown, however, that in all the worst cases consecutive lesions in the peritoneum and the veins and lymphatics of the broad ligament exist, and it is to them rather than the primary lesion that the graver symptoms are due.

The extirpation of the uterus in these cases, therefore, not only fails to remove the disease, but adds the shock of a major operation, and by opening up large areas of cellular tissue to the infective process and disturbing the protective thrombi in the veins of the broad ligament increases the danger. There are, however, three conditions in which hysterectomy may be indicated in puerperal sepsis:

(1) When a sloughing myoma is present;

(2) When in addition to sepsis the uterus is ruptured; and

(3) When a large solitary abscess forms in the uterine wall.

In regard to these, the liability for uterine myomata to become infected and necrose in the puerperium is well known. Where a patient with a myomatous uterus has passed safely through labour, but during the course of the lying-in the tumour becomes tender and the temperature rises, operation should not be delayed. The removal of the uterus in these cases is to be carried out through an abdominal incision, and the entire organ must be removed. The subject will be further discussed when dealing with the treatment of puerperal infection from the clinical standpoint.

Rupture of the uterus is usually a disaster producing immediate symptoms. Many of these cases are subjected at once to hysterectomy. In others the rent is sutured either through an abdominal wound or per vaginam. Under certain circumstances, especially where the means of immediate operation are not at hand, the case is treated by simply plugging the aperture in the uterine wall and the cavity of the uterus with gauze. The last two methods of treatment may be followed by intra-uterine sepsis, and under such circumstances the removal of the uterus has to be taken into consideration. Where an abdominal operation has already been performed and the wound in the uterus sutured, the second operation, if it is decided to remove the uterus, should certainly be

carried out through the previous incision. In cases where the rupture has been treated by gauze-packing, and especially if it is situated low down, vaginal hysterectomy may be employed.

Occasionally the fact that the uterus is ruptured or perforated is only discovered after the lapse of some days, in the course of exploration of its cavity for symptoms of puerperal or post-abortional sepsis. This is more commonly the case when dealing with criminally provoked abortion. Under such circumstances the uterus should be removed and the pelvis drained. Either the abdominal or vaginal operation may be practised.

Finally, hysterectomy is indicated when the uterus has been perforated in the course of digital exploration or curettage for septic infection. For however much the necessity for the operation is to be deplored, the leaving of an infected wound through the uterus into the peritoneal cavity would be almost certainly followed by fatal peritonitis.

Hysterectomy for rupture of the uterus complicating puerperal sepsis should always be total, and is best carried out through an abdominal incision, because the condition of the pelvis can be inspected, blood clot, pus and infected serum can be better removed, and the parietal wound can be advantageously used for drainage. Finally, if thrombosis of the broad ligament veins is detected they can be ligatured beyond the thrombus, a proceeding impossible in vaginal hysterectomy, see p. 681.

Solitary abscess of the uterine wall is a rare condition. It is usually subperitoneal in position, and may form a large swelling. Its diagnosis is impossible, and most of the recorded cases have been mistaken before the operation for a pyosalpinx, an ovarian abscess or a loculated collection of pus in the peritoneal cavity, for which supposed conditions the abdominal cavity was opened. An abscess of the uterine wall having been discovered, it may be simply stitched to the abdominal wound, opened and drained, or the whole uterus may be removed.

Which of these two proceedings should be the one of choice depends upon the position of the abscess, and the condition of the rest of the uterus and the parts around. If the tubes be not infected, no extensive peritonitis present, and the sac easily brought to the abdominal wall, drainage should be employed; but where salpingitis coexists and the uterus is surrounded by adhesions, or where extensive peritonitis is present, it is better to make a clean sweep of the uterus and tubes, and to drain the pelvis both through the abdominal wound and the open vagina.

Ligation of the Pelvic Veins.—Ligation of the pelvic veins in

puerperal fever was first proposed by Trendelenburg on the analogy of legation of the internal jugular vein for lateral sinus thrombosis, the object being to prevent the absorption of toxins and bacteria into the circulation from the area of thrombo-phlebitis. The operation is still upon its trial, but a considerable number have been recorded. Its *rationale* depends on the fact that in a certain proportion of cases of puerperal fever the principal consecutive lesion is a thrombo-phlebitis of the veins in the broad ligament, and particularly of the ovarian veins.

If this was the only lesion, ligation of the veins above the seat of inflammation would obviously be the treatment indicated. Unfortunately this is not so, for the majority of cases so affected also present diffuse lymphangitis of the pelvic cellular tissue and peritoneal infection as well. Neither is it possible, even presuming that the spread of infection is solely by the medium of the veins of the uterus, to entirely cut them off from all communication with the general circulation.

A further difficulty arises from the fact that thrombo-phlebitis only exists in a certain number of the cases of puerperal infection, and that the clinical distinction of those that have it from those that have not is very difficult.

The most characteristic symptoms of thrombo-phlebitis of the pelvic veins appear to be repeated rigors, and it is usually agreed that five rigors should have occurred before the operation is indicated.

In certain cases the thrombosed veins can be palpated through the abdominal wall as tender elongated swellings running out from the side of the uterus, but these are probably cases complicated by broad ligament lymphangitis, which makes the operation less favourable than in those in which thrombo-phlebitis alone is present. V. Bardleben lays great stress on feeling the veins as an indication for performing the operation.

As the ovarian veins on both sides are usually affected, it is necessary to ligature both of them, whilst in a proportion of cases the uterine veins are also thrombosed, necessitating ligation of the internal iliac veins in addition.

As regards the ovarian veins there are two methods of applying the ligatures, extra-peritoneal and intra-peritoneal. Extra-peritoneal ligation is the operation preferred by Trendelenburg, and is performed by an incision similar to that required for the old operation of ligating the common iliac artery. The peritoneum is pushed inwards, the vein found and traced upwards to its termination in the left renal vein or the inferior vena cava, and a ligature is then applied as high up as possible.

The majority of surgeons, however, prefer the intra-peritoneal method, which necessitates only one incision in the middle line, and through which the internal iliac veins can also be ligated if desired. The abdomen being opened, the solidified ovarian vein is defined, and the peritoneum just outside the root of the ovarico-pelvic ligament being incised vertically, the continuation of the vein under the peritoneum is traced upwards as high as possible, and a ligature placed upon it at that spot (Fig. 158). The internal iliac veins are then exposed if necessary on the side wall of the

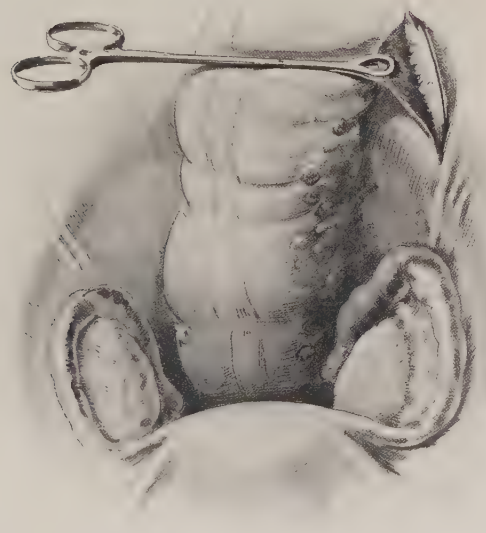


Fig. 158.—Ligature of the Pelvic Veins. Exposure of the Ovarian Vein.

pelvis and similarly ligatured. It is not necessary to exsect any portion of the veins, but it is essential to place the ligature above the thrombus.

It will be seen that the operation is one demanding a considerable degree of surgical skill, especially if the iliac veins are ligatured, and, moreover, is of some severity, taking into account the parlous state of the patient.

Von Herff collected thirty-seven cases with a recovery rate of 38 per cent., the best results being attained in the more chronic cases. According to him, the intra-peritoneal method is much

more successful than the extra-peritoneal. Marked signs of septic pneumonia or cardiac involvement contra-indicate the operation.

As has been said, the operation is on its trial, and at present the cases in which the operation is clearly indicated are few. These are those with prolonged fever and recurring rigors, after every one of which the symptoms undergo exacerbation. If the thrombosed veins can be felt the decision will be much easier. Large size and tenderness of the uterus, foul discharge and signs of peritoneal involvement, such as abdominal distension and pain, point to the symptoms being due to something besides thrombo-phlebitis, and therefore contra-indicate the operation; conversely, the absence of such features suggests its propriety.

Fig. 159.—Position for the Incision in Pelvic Cellulitis.

Drainage of the Pelvic Cellular Tissue.—Although the pelvic cellular tissue, especially that of the broad ligaments, is usually more or less involved in puerperal sepsis, it is usually but a part of a more extensive consecutive lesion, of which the affection of the peritoneum and the veins draining the uterus is the more serious part.

In certain cases, however, broad ligament cellulitis is the leading feature. These cases are less severe and of much better prognosis than those in which high fever and septic symptoms are unaccompanied by any definite inflammatory swelling.

Most cases of puerperal cellulitis go on to suppuration, and the abscess formed may be very large, the pus mounting up into the iliac fossa, and making its way under the crural arch or through the obturator and sacro-sciatic foramina into the thigh. In most

instances the abscess forms on the left side, and it is often associated with thrombo-phlebitis of the left femoral vein.

Cases of puerperal cellulitis require drainage of the cellular tissue tract involved. The incisions for this object should be made over the most prominent part of the swelling. Occasionally the mass can be best opened from the vagina through the lateral wall and fornix. More commonly the most accessible point is situated just above Poupart's ligament, on the abdomen, or further out near the superior iliac spine (Fig. 159). The thigh, especially on its inner and back aspect, should always be carefully palpated, and if fluctuation be detected, an additional incision or incisions should be made there. In a large abscess several openings and counter-openings will be required.

The operation is simple, the pus being usually struck at the first incision. If this is not the case the blunt points of a pressure forceps or the finger-tip should be used to search for it. The opening into the abscess cavity should be free and the interior should be explored. Not infrequently several cavities are present. The pus having been evacuated and any necessary counter-openings made, drainage should be carried out by lengths of $\frac{3}{4}$-inch rubber tubing. Subsequently the cavity may be irrigated with hydrogen peroxide solution (5 volumes) until fairly clean, when it should be allowed to close by granulation, the tubes being daily shortened.

Most of these cases make an excellent recovery, but death may occur from some associated lesion or from ulceration of the iliac or femoral artery. In the event of the latter disaster the cavity should be plugged with gauze temporarily, and the common iliac artery ligated through an abdominal incision. Death is, however, almost certain. See also p. 513.

Removal of a Pyosalpinx.—As has been shown, the Fallopian tubes are liable to an acute ascending infection, which rapidly spreads *viâ* their lumen into the peritoneal cavity. The tubes in these cases are never occluded, and indeed very rarely in a condition of frank suppuration, the condition already referred to, namely, that of infection without inflammation, being present.

Occasionally, however, the infection is less fulminant, and results in the formation of a pyosalpinx or tubo-ovarian abscess, usually on both sides. Such cases present the classical features of acute salpingitis and pelvic peritonitis, and a very definite swelling behind the uterus is formed after the lapse of a few days. It is important to distinguish the condition from broad ligament cellulitis, from which it differs, in that the swelling lies behind the uterus, in or near the mid-line and in front of the rectum.

Where a pyosalpinx exists it must be removed. This subject is further discussed on p. 515.

NON-OPERATIVE TREATMENT.—The Identification and Isolation of the Causative Organism.—It is of the first importance when dealing with a case of puerperal sepsis to identify and, if possible, to isolate the causative organism.

The elaborate apparatus required to secure a bacteriologically pure sample of the uterine contents is not obtainable in ordinary practice, nor is it necessary for the purpose in hand. A sterile swab, mounted on a forceps and passed into the uterus or, if this is not possible, into the vagina, will procure a satisfactory specimen of the lochial discharge. The swab should be preserved in a sterile test-tube, and immediately forwarded to a competent bacteriologist. Where the uterus has been explored, some of the contents removed from the cavity should be similarly preserved.

If the obstetrician has sufficient knowledge of bacteriology and possesses a $\frac{1}{12}$-inch objective, an immediate determination of the nature of the organism can often be made. Several coverslips carefully cleaned with alcohol should be smeared with the lochia or uterine contents, dried and stained with methylene blue or by Gram's method. If on examination streptococci are detected, the case is clear. In their absence it will be necessary to wait for the bacteriologist's report.

The bacteriologist should be asked for an immediate report on a "smear" preparation, and a further report founded on cultures. A bacteriological report founded on cultures takes twenty-four to forty-eight hours, whilst isolation of the causative organism in pure culture may take twenty-four hours more. The latter is particularly important in view of the possibility of a vaccine being required, and the bacteriologist should be informed that this may be the case, so that he may preserve the pure cultures for this purpose.

Where septicæmia is feared, the blood of the patient should be investigated for the causative organism, see p. 510.

Serum Treatment.—Though the hopes founded on the serum treatment of puerperal sepsis have not been fully realised, yet it is undoubted that in certain cases very favourable results follow its admininistration.

For this reason anti-toxic serum should always be given in the more severe types of the disease, and the more, because if no good is done, yet no harm will result from the administration.

Seeing that in the majority of cases of grave puerperal sepsis the streptococcus is the causative organism, anti-streptococcic serum should be given whenever a definite bacteriological finding

cannot or has not yet been obtained. Still more is it indicated when the presence of streptococci in the discharge is proved.

The dose given should be large; at least 20 cubic centimetres is required for the first injection: this should be repeated in six hours and again in six more. If at the end of this time no material change in the patient's state has been produced, its administration should be stopped as useless.

As it has been shown that a number of varieties of streptococci exist, it is most important to use a polyvalent serum.

The failure of anti-streptococcic serum to give a good result may be due to the streptococcus not being the causative organism in that particular case, or, being the cause, yet of a different variety to that used in the production of the serum. Further, it is certain that in most of the fatal cases the patient has suffered from the combined toxic effects of several species of bacteria, the primary infecting organism being rapidly followed by secondary infection from the bowel and elsewhere. Lastly, it is probable that in the later stages of the disease the condition is the product of several factors, of which the poisonous products of the infecting bacteria are only one.

As it has been shown that in the most severe cases B. coli commune coexists in the uterus with streptococci, it would appear rational to combine the administration of anti-coli serum with that of anti-streptococcic serum, even as a prophylactic in those cases in which the streptococcus alone is found in the uterus. It is doubtful, however, whether an efficient anti-coli serum has been prepared.

Where the bacteriological investigations show a causative organism other than the streptococcus, such as pneumococcus or staphylococcus, the corresponding sera may be tried, but too much must not be hoped from these preparations.

As regards the effects of serum therapy generally in puerperal sepsis, the cases may be divided into three groups:

1. Those in which an immediate and marked amelioration of the symptoms follows the injection;

2. Those in which the patient manifests a certain slight improvement, or, at all events, ceases to lose ground; and

3. Those in which the gravity of the symptoms increases, in spite of the treatment.

In the first case the continuance of the injections is absolutely indicated. In the second it is wise to continue them, for in this disease every day gained without further downward progress materially improves the prognosis. In the third the administration should at once be stopped, or some other make or form substituted.

It is claimed by some that results equally as good as those obtained from subcutaneous injection follow administration by mouth or rectum. Whilst it is preferable, in our opinion, to use the former method, rectal injection is with advantage employed where urticaria of the skin is provoked by subcutaneous injection, or where it has frequently to be repeated.

Serum may be directly injected into a vein. This method has been carried out for us on two occasions by Dr. H. Bayly. Though theoretically sound, it is doubtful if it is more efficacious than the older methods. It certainly causes a good deal of distress to the patient.

Calcium lactate is stated to diminish the liability to urticaria and other results of anaphylaxis. A daily dose of 25 grains should be given over the period during which the serum is being administered.

Vaccine Treatment.—Though, like serum therapy, the vaccine treatment of puerperal sepsis has not fulfilled all the expectations at first formed of it, yet in certain cases excellent results have been obtained.

Vaccine treatment is rarely successful in high-continued fever with a general typhoid state, or where some gross consecutive lesion such as peritonitis or cellulitis is present. It is most likely to do good where long-continued fever with marked remissions exists, and the septic state of the uterus appears to be the principal lesion. The vaccine is preferably prepared from the causative organism previously isolated from the discharge of blood; but if this is not possible, a stock vaccine may be used instead. Much depends upon the size of the dose and its period of administration.

A streptococcus vaccine needs to be used very cautiously. The first dose should not exceed 5,000,000. The injection should be repeated not oftener than every third day, and if well borne should be gradually increased in amount up to 30,000,000 or more. If an "opsonist" is available he should be employed to ascertain by blood examination the most favourable period for the next injection. Failing this, the dose should be repeated at the time when the temperature is as low as it is daily accustomed to fall.

Serum and vaccine treatment are usefully combined, better results being claimed for this combination than for either therapeutical method used separately.

Quite recently the subject of the use of sensitised vaccines in the treatment of puerperal sepsis has claimed attention. The vaccine is treated *in vitro* with serum derived from the patient, and

immune serum from elsewhere, and as a result it is stated that the toxic elements in the vaccine are largely excluded, whilst its power of producing an immune reaction in the patient is much increased; much larger doses can be given than is the case with ordinary vaccines. The method is still on trial.

Phylacogen Treatment.—Injections of "phylacogens" (*i.e.*, solutions of the products of bacteria, the bacteria themselves having been removed by filtration) corresponding to the organism isolated from the patient have been used in the treatment of puerperal sepsis lately. But little is known of their action at present, and good results have been reported. That most usually indicated in puerperal sepsis is the "mixed infection phylacogen." Our experience of this treatment is slight, but if cautiously used with minimal initial doses it would appear harmless and worth trying in cases that have resisted other methods.

Colloidal Metals.—The injection of certain metals in the colloidal state has been practised in France and elsewhere in the treatment of puerperal sepsis. Colloidal Rhodium ("Lantol") would appear to be the most active. Doses of 3 to 6 c.c. are advised by hypodermic injection.

Intra-uterine Douching.—Intra-uterine douching, though very commonly used in the treatment of puerperal sepsis, is not a satisfactory proceeding when used alone, and it should never be employed to the postponement of exploration under an anæsthetic, as is constantly done. This constitutes the gravest objection to its routine practice in cases of puerperal pyrexia. One constantly sees several days wasted in this inefficient proceeding, when the more vigorous method of treatment should have been adopted at once.

It is not easy to effectively wash out the cavity of the uterus, especially in restive patients, and where the uterus is very tender.

In puerperal sepsis the surface of the uterine wall is covered by a film of closely adherent blood clot and coagulated serum, pus or necrotic tissue which it is impossible to wash away, and which completely protects the underlying bacteria from the effects of the chemical solution.

The manipulation may dislodge thrombi in the uterine sinuses or the pressure of the douche may force septic material up the Fallopian tubes.

The proper time, therefore, to employ the intra-uterine douche is immediately after the uterus has been explored and whilst the patient is still under the anæsthetic.

If uterine exploration has not been effective, the daily repetition of the douche will not improve matters, and may, as just pointed out, make them worse.

The solution used should be fairly strong, the best being that of biniodide of mercury (1 in 1,000).

The Application of Strong Antiseptics to the Uterus.—Many strong antiseptic substances have been applied to the interior of the uterus in puerperal sepsis. Amongst them may be specially named absolute alcohol, alcoholic solution of iodine, formalin and izal. The application can be carried out without an anæsthetic by means of swabs mounted on a long holder, but it is most efficiently performed under an anæsthetic after the uterus has been explored or curretted.

Of the various substances mentioned, alcoholic iodine solution is probably the best, but strong izal has been recommended warmly by some authorities.

For the reasons previously stated when dealing with curettage, we are not in favour of such measures, for although their action on the organisms in the cavity of the uterus cannot be gainsaid, yet to destroy those already in the uterine wall would involve injury to the tissues in which they lie. Were absolute sterilisation of the infected area possible by such means, this would not be a drawback; but the method fails even on a surface like the skin, the most favourably placed for the attempt. The gain, therefore, of the destruction of a partial number of organisms is much more than balanced by the injury to the tissues that it involves.

Vaginal Douching.—As already stated, we are strongly in favour of routine vaginal douching after all labours, when it can be skilfully carried out. Even those opposed to this practice admit its necessity in cases of puerperal sepsis.

The retention in the vagina of a puddle of uterine discharge swarming with bacteria is obviously undesirable, especially when more or less breach of the surface from lacerations of the cervix and vaginal outlet coexist.

It has been shown that in many of the slighter cases of puerperal sepsis these lacerations constitute the primary and only lesion, and in such frequent vaginal douching may alone effect a cure, whilst in intra-uterine sepsis such infected wounds add their quota to the general state of ill-being.

To be efficient, vaginal douching should be repeated every four hours, in these cases the main object being to wash away the organisms rather than to destroy them *in situ*. For this reason the solution used should be dilute, so as to avoid setting up irritation of the parts. The particular antiseptic used is of less consequence,

biniodide or perchloride of mercury (1 in 4,000), lysol or tincture of iodine, or boracic acid (ʒj ad Oj) are all satisfactory.

The Administration of Saline Solution.—The use of saline solution is indicated in many septic states, and is usefully employed in certain cases of puerperal fever presenting signs of profound toxæmia, especially when accompanied by vomiting and diarrhœa.

In such patients a progressive loss of fluid is occurring, with the result that the percentage toxin content of the blood is continually rising. The administration of saline solution replaces the fluid lost and dilutes the bacterial poisons dissolved in the blood serum.

It is known that life may be maintained for several weeks without any food if sufficient water is supplied, and the practice of treating cases of gastric ulcer by rectal saline injections, all food having been withdrawn, illustrates the same point.

Moreover, a raised blood pressure promotes transudation from the vessels rather than into them, so that the absorption of toxic products into the blood is hindered, and where drainage is established a free discharge of serum is promoted to their further elimination. Thus saline injection is particularly indicated after incision and drainage of the peritoneal cavity for puerperal peritonitis.

In puerperal fever, saline solution may be administered either by the rectum, or by injection into the cellular tissue.

As regards administration by the rectum, it may be periodically introduced by means of a long rectal tube, with a glass funnel attached to it by means of a short piece of rubber tube and a glass tube union. The fluid should be run in very slowly, about 6 oz. at a time, and repeated every four or six hours.

Instead of periodic introduction, continuous saline injection into the rectum may be practised, the fluid being syphoned in at very low pressure.

So many cases of severe puerperal fever, however, present diarrhœa that continuous infusion into the cellular tissue is the only way of administering it.

The apparatus required is simple: A large beaker or jug to hold the solution, 1 yard of red rubber tubing ending in a T-shaped glass union, to which are attached two shorter pieces of tube bearing at their ends the hollow needles. In emergency the union is not necessary, one needle directly fixed to the long piece of tubing being sufficient.

Syphonage action having been established, the needles are inserted, one under each breast or into each thigh or flank, and the

fluid is allowed to slowly run into the cellular tissue. The water head required is about 1 foot, and the rate of inflow should not exceed $\frac{1}{2}$ pint an hour (Fig. 160).

The area adjacent to the needles should be watched in case it swells, in which event the inflow from that needle should be stopped for a while by clamping the rubber tube leading to it by a forceps Where two needles are in use, it is a good plan to let the stream

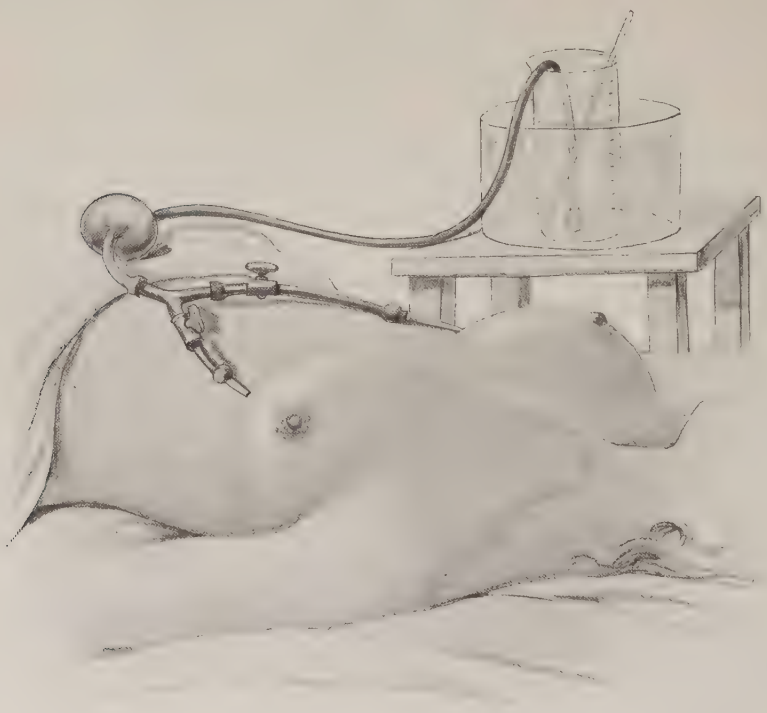


Fig. 160.—Continuous Infusion under the Breasts.

run through them alternately. It is important to thoroughly clean and sterilise the skin before inserting the needles.

By means of continuous saline infusion a patient may be kept alive for days without any other means of sustenance.

Drugs.—Drugs are obviously of very secondary importance in the treatment of puerperal sepsis.

The most valuable is alcohol, in the form of ardent spirit or champagne. Next in order, opium and its derivatives and the various hypnotics may be named. These patients rarely sleep much, and in bad cases often exhibit a distressing condition of

mental alertness. In such sleepgiving drugs are indicated. Of this group "bromidia," in our experience, is the best; but sulphonal, trional, paraldehyde and veronal can all be tried, whilst morphia answers well in some cases.

In cases exhibiting much excitement bromides should be given, whilst in those in which a form of septic mania is present, hyoscine may be necessary.

Strychnine and digitalis are resorts when the strength is failing, the first being specially useful, whilst ether and ammonia are indicated if the respirations are much embarrassed.

Quinine is often given to reduce the fever, but its administration is illogical and has nothing to recommend it. For the headache, present in some cases, aspirin or phenacetin may be given, but their continued use for the purpose of lowering the temperature is not advisable.

General Management and Nursing.—The general management of a case of continued puerperal fever is similar to that of severe sepsis from causes unconnected with labour. The temperature and pulse should be taken and charted every four hours, and the urine should be measured and examined daily.

The backs of these patients must be very carefully looked to, for bedsores develop rapidly. The skin should be washed with soap and water at least twice a day, or more often if necessary, and powdered with a mixture of starch-powder, 3 parts; boracic acid, 2 parts; and oxide of zinc, 1 part. If there is incontinence of urine or diarrhœa, equal parts of zinc and boracic acid ointments should be first rubbed on before applying the powder.

The mouth also quickly becomes very foul. It should frequently be washed out with a mixture of boracic acid solution and glycerine (3 to 1), to which a little lemon juice has been added. Where the patient is too ill to wash her own mouth it should be swabbed out with pieces of wool on a forceps.

The diet must be fluid and easily assimilable, and should be administered every two hours if the patient be awake. It is often a difficult thing to get the patient to take sufficient nourishment, but it is most important to maintain the strength as far as possible. Where nutriment cannot be retained, saline injections, as previously described, must be relied upon. Though the temperature is rarely continuously maintained at a very high level, yet when it rises above 104° F. steps should be taken to lower it by tepid sponging. A patient with a temperature over 103° F. should be covered by a sheet only.

The patient should be nursed in the raised posture as much as

possible to promote drainage from the vagina, and to prevent gravitation of infected serum from the lower to the upper part of the peritoneal cavity. This position is best maintained by means of a large pillow or bolster placed under the patient's thighs, and retained there by two pieces of bandage sewn to either end of it, and fastened to the upper bed-posts. The vagina should be douched at least five times a day, and the external genitals carefully washed with soap and water, swabbed with an antiseptic solution, and well smeared with a mixture of zinc and boracic acid ointments. If this is not done the parts may become very excoriated.

It is most important that the nurse when performing these duties should avoid contaminating her hands as much as possible. Absolute protection can only be obtained by the use of rubber gloves. Failing this she must very carefully wash her hands, and afterwards soak them in an antiseptic solution. The manipulations should be carried out by forceps whenever possible.

All pads applied to the external genitals must be immediately burnt after removal.

THE TREATMENT OF PARTICULAR CLASSES OF PUERPERAL SEPSIS.

Having now reviewed the various curative measures used in puerperal sepsis, it will be useful to consider them as applied to particular classes of case.

As follows from a study of the pathology of puerperal infection, great variations obtain in the clinical features presented by different patients. Whilst it is impossible to lay down rules of treatment applicable to all cases, yet a rough classification into clinical groups is feasible for this purpose.

Cases with Early Slight Fever.

Every case of fever in the puerperium should be considered as due to septic infection unless it can be proved otherwise. There are only two forms of non-septic fever at all commonly met with in a puerperal woman, namely, that due to reaction after a severe labour, and that due to painful conditions of the breast, see p. 521.

Given, then, that slight fever manifests itself in the first week of the puerperium, and that it appears to be due to septic absorption from the genital canal, the first point to be decided is whether the lesion is in the uterus or lower down.

It has been shown that in many of the slighter forms of puerperal fever the uterus is sterile, the condition being due to absorption from wounds in the cervix, vagina or vulva. This is especially the case

after first labours, in which lacerations of the perineum and vaginal outlet are constantly present. Deep perineal tears approaching the anus, or actually extending into it, are apt to be followed by a good deal of inflammation, and if hæmorrhoids are present, as they often are, these become much inflamed and swollen also. In such cases some fever and constitutional disturbance is always manifested.

If in addition the uterus is firm, normally involuted and not tender, and the lochial discharge is natural, the symptoms are to be attributed to the laceration alone. In such a case all sutures in the perineum must at once be removed, the vagina should be douched every four hours, and warm boracic fomentations applied to the infected laceration. This is especially necessary if inflamed piles are present, and much relief will also follow the application of cocain to them by ointment and suppository.

On the other hand, tenderness or abnormal size and softness of the uterus point to uterine infection, and this diagnosis is the more to be inclined to if the patient be a multipara, in whom lacerations of the lower tract are neither to be expected nor found. In the absence of indications in either direction it is better to treat the case on the graver assumption that the symptoms are due to uterine infection. If uterine infection is diagnosed or suspected, the uterus should at once be explored under an anæsthetic in the manner already described, and a specimen of the lochial discharge should be obtained at the same time for bacteriological investigation.

The bowels should be opened and the patient should be propped up in bed to encourage drainage. The vagina should be douched every four hours with some weak antiseptic solution; but it is not advisable, in our opinion, to irrigate the uterus, even if the temperature does not fall after exploration of the uterus.

In this event it will be necessary to consider whether to pursue expectant treatment or to administer anti-toxic serum or a vaccine. The result of the bacteriological investigation and the condition of the patient will decide this.

Cases with Early Acute Fever.

Cases in which the temperature abruptly rises to a high level within the first few days after labour are nearly always due to streptococcal infection of the uterus, especially if the onset of the pyrexia is associated with a rigor.

Sudden and high fever is very unlikely to be due to infection of vaginal lacerations or prelactational swelling of the breasts. There is, however, a condition of the mammary gland known as "flushed

breast," which does produce sudden elevation of temperature. It presents as a tender flushed patch, roughly triangular in shape with its apex to the nipple, and is due to duct infection of the gland lobules. It quickly subsides with warm fomentations, and coincidently the temperature falls.

This cause of fever being excluded as well as any accidental condition not connected with the labour, it is reasonably certain that the uterus is at fault. In the early days of acute puerperal sepsis few or no physical signs may be present, but the uterus is usually tender on bimanual examination.

Sepsis having been diagnosed, the uterine cavity should immediately be explored and anti-streptococcic serum given, and a bacteriological examination of the uterine contents should be made as soon as possible.

The bowels must be opened, vaginal douches administered, and the patient should be sponged with warm water if the temperature reaches above 104° F.

If these means fail and the case passes into one of continued fever, it will have to be treated in accordance with the lines indicated in the next section.

Cases presenting Continued Fever.

Where the case does not come under treatment until continued fever is established, the importance of obtaining a bacteriological diagnosis is no less than in those seen at the onset of the symptoms. Samples of the uterine discharge or contents should be immediately obtained and investigated, and, in addition, in all severe cases the blood of the patient should be examined and cultured. To do the latter efficiently, a considerable quantity must be withdrawn from one of the veins of the forearm, or, if these are not prominent, one of those on the back of the hand must be chosen.

The blood is withdrawn by a sterile syringe, the skin over the vein having previously been carefully washed and then scrubbed with absolute alcohol. The vein having been made prominent by compression above, the needle is driven direct into it in a slanting direction. Where a bacteriologist is available, it is better that he should perform the operation, but, in his absence, the practitioner can do it if he possesses an all-glass syringe capable of being boiled. The blood, having been withdrawn, is used to inoculate the culture media.

If these are not available, the syringe with the contained blood should be sealed with hot melted paraffin wax (a paraffin wax candle will provide this), and it should then be sent without delay to the

bacteriologist, with a request for a report on its bacteriology and microscopic characters.

At the same time the ear of the patient should be pricked and several slides smeared with the blood in a thin film. This can be done by streaking it over the surface of the slide by means of the edge of another slide. Both should have been previously cleaned with alcohol. These films serve for an immediate report on the bacteriological content and leucocyte count.

The treatment of a case of continued puerperal fever depends in part as to whether it has already been operatively dealt with in the manner previously described, or whether practically nothing has been done beforehand.

Where uterine exploration has been efficiently performed and failed, the question whether any advantage is to be gained by further intra-uterine treatment has first to be considered. Such treatment may take the form of a repetition of the exploration, active curettage, the application of strong chemical solutions, or iodoform gauze plugging. Where a foul discharge from the uterus exists and the temperature is maintained at a fairly constant level, and the absence of rigors, of tenderness over the broad ligaments and of distension and rigidity of the lower abdomen negatives the suggestion of thrombo-phlebitis or peritonitis, it may be advisable to re-explore the uterus, apply an alcoholic solution of iodine to its interior, and plug it with iodoform gauze. Curettage we are not in favour of for the reasons previously given.

On the other hand, evidence pointing to thrombo-phlebitis or peritonitis absolutely contra-indicates further intra-uterine manipulation, which can do no good, and may by dislodging clots or disturbing adhesions make matters much worse.

If no previous intra-uterine exploration has been made when the case comes under treatment, this operation is the first line of treatment that suggests itself. In general it may be said that the shorter time the symptoms have existed the more reason there is to explore the uterus, and that the indication is stronger when the uterus is unduly large and the discharge offensive.

After these late explorations, especially when nothing is found inside the uterus, the application of alcoholic iodine solution and iodoform gauze plugging is specially indicated.

There are certain cases in which no operative procedure is to be entertained, whether the uterus has been previously explored or not, namely, those in which high-continued fever, diarrhœa, and a general typhoid state is combined with a uterus perfectly painless and a

scanty non-offensive discharge. Most of these patients are going to die, and any operation merely accelerates the end.

They should be treated by continuous saline injection into the cellular tissue, anti-toxic serum, a vaccine and stimulants and opiates.

Cases exhibiting definite signs of peritonitis are comparatively uncommon. When such exist, pelvic drainage by abdominal incision is the best course to pursue. Hot fomentations to the abdomen tend to relieve pain, while flatulent distension is met by the use every six hours of the long rubber rectal tube. If flatus does not pass freely, the bowel may be washed out with 1 pint of soap and water, to which is added $\frac{1}{2}$ oz. of turpentine, well stirred in.

The fluid is slowly run in through the long rectal tube by means of a glass funnel, and having been allowed to remain for a few minutes, the end of the tube with the funnel attached is lowered into a basin of boracic acid solution.

The turpentine solution as it runs out aspirates the flatus in the intestine above.

The administration of eserine sulphate or salicylate ($\frac{1}{100}$ gr.) every four hours stimulates peristalsis. Intra-muscular injections of infundibular extract (pituitary extract) repeated at the same intervals have the same effect.

The old fashion of giving repeated doses of purgatives, especially salines, is not to be recommended. It invariably fails to open the bowels, and merely increases the sickness and distress.

The strength of these patients must be maintained as much as possible. Mouth feeding is usually useless, but small quantities of brandy and water may be retained.

Rectal injections or nutrient enemata, with brandy added if need be, are valuable; but in desperate cases, both with peritonitis and without, nothing equals continuous saline infusion into the cellular tissue. It is especially indicated where both vomiting and diarrhœa exists, and it is impossible by any other means to replace the fluid lost by the patient.

Evidence of thrombo-phlebitis would indicate ligation of the pelvic veins. The difficulty of being reasonably certain that such exists has been referred to. In a few cases the veins are palpable; more often their presence is inferred from the occurrence of repeated rigors and long-continued fever. It is of no use performing this operation where the uterus is very large and the discharge purulent and foul. It is most likely to succeed when no definite uterine or peritoneal signs are present: in short, when it appears probable that the inflamed broad ligament veins are the principal lesion.

Where signs pointing to pelvic cellulitis develop, the swelling should be incised as soon as possible in the manner previously described. Many of these cases also present femoral thrombo-phlebitis as well. The treatment of this complication will be considered in the next section.

The importance of obtaining a bacteriological report as to the nature of the infecting organism has already been insisted on.

In all cases of continued puerperal fever anti-toxic serum, and especially a vaccine, should be given a trial, see p. 500.

Cases in which Fever begins Late in the Puerperium.

Where the symptoms of puerperal sepsis do not begin until the second week they are probably due to inflammation of the pelvic cellular tissue, inflammation in the Fallopian tube or ovary, or thrombo-phlebitis of the femoral vein.

All these lesions are sometimes seen in the more acute cases beginning in the first week, but they then merely form a part of the general septic state, whereas in these late cases the inflammation tends to be localised to these parts, and forms the principal feature of the illness.

Cellulitis.

SYMPTOMS AND SIGNS.

Inflammation of the pelvic cellular tissue when a late sequela of labour usually affects the lymphatic tract that drains the cervix and the vagina.

This tract passes directly outwards under the ureter to reach the pelvic side wall, from whence it mounts upwards to communicate with the glands along the external iliac vessels and the lympathics of the iliac fossa. The mass formed by the inflamed connective tissue, therefore, lies in the base of the broad ligament, and may extend from thence into the iliac fossa and upwards towards the loin. This variety is termed lateral cellulitis, and the primary lesion causing it is usually a septic laceration of the cervix. As already stated, it occurs usually on the left side. Less commonly the cellular tissue between the vagina and base of the bladder is affected (anterior cellulitis), or that in the recto-vaginal septum and utero-sacral ligaments (posterior cellulitis).

In the first case the mass extends down the anterior vaginal wall to within an inch of its outlet. In the second it lies between the vagina and rectum and may extend backwards until it encircles the latter canal.

Occasionally the entire cellular tissues of the pelvis may be inflamed (complete cellulitis), producing a characteristic hardening of the whole of the pelvic floor, which has been likened to the feel of a cast in plaster of Paris.

The attack begins with fever, rapid pulse, and much pain referred to the lower abdomen. Micturition is very painful and the urine usually contains pus. If the region of the bowel is implicated, the passage of a motion causes great distress, and if much narrowing of its lumen be present, diarrhœa will supervene. On abdominal examination tenderness is early present; later on a definite swelling appears above the pubes, tending outwards and parallel to Poupart's ligament, and eventually perhaps filling the iliac fossa.

The process may abort and the symptoms gradually subside.

More commonly pus formation occurs, with high irregular fever and rapid wasting. In some cases chronicity is entered upon without obvious signs of pus formation, a hard indurated mass remaining, with persistent pain and tenderness and irregularly recurring bouts of fever.

If an abscess forms it may burst spontaneously just above Poupart's ligament or into the vagina, rectum or bladder. Not infrequently it penetrates into the thigh under Poupart's ligament, or through the obturator or sacro-sciatic foramina.

Femoral thrombo-phlebitis is often associated with pelvic cellulitis.

DIAGNOSIS.

It is important not to mistake a large pyosalpinx for the mass formed by pelvic cellulitis. A pyosalpinx, though occurring frequently after abortion and miscarriage, is less common after labour; for puerperal infection of the tubes usually extends directly to the peritoneum without occlusion of the ostia.

The distinction between a pyosalpynx and the mass of pelvic cellulitis is usually easy, the swelling in the former condition being more central and lying posterior to the uterus, which it presses forward, whilst the latter is markedly lateral and usually limited to the left side.

More difficult is the diagnosis from ovarian abscess, the tumour formed by which underburrows the broad ligament.

TREATMENT.

The general treatment of late puerperal cellulitis is the same as that of puerperal sepsis in general, but exploration of the uterus is strongly contra-indicated. Indeed, in many of these patients

that organ is not obviously affected, the infection probably starting in some laceration of the cervix or vagina.

The abdomen should be fomented and the vagina frequently douched, and so soon as the swelling in the broad ligament is sufficiently defined, it should be incised from either above or below, as described on p. 499.

Salpingitis.

Suppurative salpingitis with loculation of the pus in the tubes occasionally occurs as a delayed manifestation of puerperal sepsis. It is then secondary to a puerperal endometritis of a relatively mild type, probably due to the late spread of infection from a septic cervical laceration. Pus is not, however, always formed, the tubes in some cases being found merely thickened by plastic inflammatory products.

A thickened or distended tube curls downwards and backwards behind the uterus. Adhesions are rapidly formed to the adjacent omentum, the bowel and the back of the uterus and broad ligament. A conglomerate mass is thus formed, lying to one or both sides of the uterus, filling Douglas's pouch and situated in front of the rectum. The onset is marked by acute pain, fever, rapid pulse, and vomiting. On examination the lower abdomen is rigid and distended from an early period. As the case progresses, an indefinite swelling appears above the pubis, not so laterally placed as that due to cellulitis, and usually partly resonant.

On vaginal examination an exquisitely tender swelling is felt behind the uterus, which is pushed forwards and more or less fixed.

The course of the disease varies. After some days of fever and distress the symptoms may subside. More commonly pus forms, with severe constitutional symptoms and rapid wasting. The tube may spontaneously empty itself into the bowel or through the posterior vaginal vault.

Many cases, however, pass into chronicity if no operative measures are undertaken, a large tender mass remaining in the pelvis, giving rise to recurring exacerbations of fever and pain.

DIAGNOSIS.

Salpingitis has to be diagnosed from cellulitis, from inflammation of a pre-existent pelvic tumour, and from appendicitis occurring late in the puerperium.

The points distinguishing it from cellulitis have already been dealt with.

In an inflamed pelvic tumour a defined mass is present from the outset, whereas in salpingitis a mass only develops after some days. The distinction of salpingitis from appendicitis depends upon the position of the inflammatory signs. If the appendix is "pelvic" a certain diagnosis is impossible.

TREATMENT.

Pyosalpinx.—If a pyosalpinx is diagnosed, the abdomen must be opened and the diseased tube or tubes removed.

A pyosalpinx should never be simply incised and drained per vaginam. Both tubes are usually affected, and the pus is often loculated. In either case it is difficult or impossible to completely evacuate it by incision, and the abdominal operation has to be resorted to in the end.

The most satisfactory period at which to operate on a pyosalpinx is a matter for nice judgment. In fulminant cases it cannot be delayed; but where possible it is better to allow the first fury of the symptoms to subside, when the removal of the pus-laden tubes is carried out with less risk.

On the other hand, too long delay is disadvantageous, for the ovaries may become so disorganised that it is impossible to conserve them.

In the fulminant cases it is usually necessary to remove not only the tubes, but the whole uterus, and often the ovaries riddled by abscesses as well. The mortality after such operations is high, and hence it is better to wait unless general peritonitis threatens.

In the more favourable cases in which it has been feasible to wait, it is often possible to remove the tubes alone.

During the waiting period the treatment is directed to the peritoneal symptoms, and consists in fomentations to the abdomen, the use of eserine and the rectal tube to reduce flatulent distension, and an absorbable fluid diet, see p. 696.

The bowels are best relieved by a small enema every other day, and the patient should be nursed in the raised posture. Morphia may be used cautiously, care being taken not to mask the symptoms.

Where the symptoms steadily subside the surgeon should wait, in the hope that entire resolution may occur.

Femoral Thrombo-phlebitis (Phlegmasia Alba Dolens, "White-leg").

SYMPTOMS.

Femoral thrombo-phlebitis usually occurs from the tenth to the fourteenth day after labour, and is frequently associated with pelvic

cellulitis. It almost invariably affects the left leg first, or is limited to it, and is ushered in by severe pain there, which is variously referred to the outer side, the course of the vein, or the back of the knee and calf. The pain, with the fever that accompanies it, commonly precedes the swelling for a day or two.

The extent and character of the swelling varies in different cases. In the main two types can be recognised. The first is characterised by an intense, non-pitting, brawny œdema, which is usually ascribed to the simultaneous blocking of both the venous and lymphatic flow, the latter being attributed to a diffuse lymphangitis complicating the phlebitis. It is doubtful, however, whether lymphangitis is really present. We ourselves incline to the view that the character of the œdema is due to a thrombosis so extensive that collateral circulation is reduced to its lowest possible limits, in support of which we would cite a case in which an identical condition followed the necessitous ligation of the common iliac vein during an operation.

In the second type the œdema is of the "pitting" variety and much less severe. These cases are sometimes described as "blue leg," the marble-white appearance that characterises the first variety being absent.

In the first variety the symptoms are very marked, the pain being intense and the fever high and long continued, while the patient wastes rapidly and presents a typically toxic appearance. The leg may remain swollen for many months, and in some cases never regains its normal size.

In the second variety the symptoms are slighter, and the œdema may have entirely disappeared at the end of a few weeks.

TREATMENT.

The leg should be raised on pillows, and the thigh (and the calf if necessary) should be fomented.

Morphia should be used to allay the pain, which is severe.

The blood should be examined for organisms, and if such be found, a vaccine should be made and administered. B. coli is probably the infecting organism in most of these cases. The route of the infection is not known, but it is probably an expression of a generalised bacteriæmia. The limb should be kept very quiet for fear of detachment of the clot, though, as a matter of fact, this is a very rare accident, most of the cases of pulmonary embolism in the puerperium being preceded by practically no symptoms at all. When the leg is first lowered to the ground an elastic crêpe

bandage should be worn, for the swelling always tends to return with the dependent position. In bad cases the bandage will have to be worn for many months.

THE PUBLIC DUTY OF THE MEDICAL MAN.

Notification.—Puerperal fever is one of the notifiable diseases, but, unlike the rest of those so scheduled, it is not, as has been shown, a single pathological entity. It is, therefore, difficult or impossible to define what from the standpoint of the public health authorities is to be included under the denomination.

In the widest sense every fever, no matter how slight, arising as a result of infection of the genital canal during labour or puerpery is in fact "puerperal fever."

Such an acceptation of the official term would involve an enormous increase in the number of notifications, and is obviously neither possible nor desirable. Most practitioners only notify a case when a fatal ending appears possible, or when assistance from the public authorities has to be sought for purposes of hospital accommodation or transport by ambulance.

Whilst there is good reason for compelling midwives to report to their local supervising authority all cases of puerperal pyrexia occurring in their practice, we are strongly of opinion that puerperal fever should be deleted from the list of diseases compulsorily notifiable by the medical man. The object of notification is to facilitate the segregation of cases of disease infective to the community at large, to enable the sanitary authorities to take steps to disinfect the dwellings of such patients, and to permit of better investigation into the causes underlying the occurrence of epidemics.

In all of these particulars notification fails in the case of puerperal sepsis, and its only effect is to cast an often unmerited stigma on the obstetrician and a consequent disinclination to comply with the law, or even to recognise the disease until it becomes extreme.

In view of the bacteriology and pathology of childbed fever there is much less reason for its notification than in the case of wound sepsis after surgical operations, an occurrence far more within the control of the medical man.

Notification is, in fact, a remnant remaining from the days when the disease was held to be due to some mysterious contagion, the method of whose spread was unexplained and unpreventable.

As the law stands, however, it is the duty of the medical man to conform with it as far as may be reasonable. The exact interpretation of this view is difficult, but we think it may be accepted that

where by reason of the bacteriological examination and the clinical picture it is apparent that the patient is suffering from infection by a virulent organism, the case should be notified as one of puerperal fever.

Attendance on other Labours.—Much more important than the matter of notification is the question as to how far it is safe for a medical man in attendance on a case of puerperal sepsis to attend another confinement.

It is shown conclusively that the conveyance of the disease from patient to patient is only possible by actual transport of the organisms on the person, clothes or appliances of the obstetrician. Such conveyance is, of course, entirely preventable, and given that he preserves both ordinary and surgical cleanliness, wears rubber gloves and sterilises his appliances, the possibility of the disaster is out of the question.

On the other hand, he has to consider that should a second case become septic, the public will be very apt to attribute the misfortune to him, whatever its real cause. And, further, in the event of such a misfortune, he himself, however unreasonable the thought, may be unable to dismiss from his mind the idea that he was the agent, and thus both his reputation and peace of mind may undeservedly suffer.

Therefore we think that, however unreasonable temporary abstention from further obstetric practice may appear from the standpoint of pathology, the medical man will be consulting his own interests best by refusing to attend other confinements while a case of grave puerperal sepsis is on his hands.

INFECTION OF A PELVIC TUMOUR.

A variety of septic puerperal fever is that due to infection of a pre-existent pelvic tumour.

Myomata.—A uterine myoma most commonly becomes infected *viâ* the cavity of the uterus, the case then being one of the ordinary type of puerperal sepsis, complicated by the presence of a fibroid in the uterine wall.

The complication is a grave one, because organisms obtaining access to the poorly vascularised tissue of which these tumours are composed usually produce infective necrosis. A myomatous uterus is further liable to a form of infection quite apart from that conveyed from the exterior, namely, an auto-infection by organisms probably derived from the bowel. This is predisposed to by injury received during the labour, and is most typically seen in the case

of a pedunculated subperitoneal mass lying behind the uterus and past which the head has been forcibly dragged, see p. 190.

A similar result also follows torsion of its pedicle, an accident most commonly met with soon after delivery. As in the case of infection *viâ* the uterine cavity, the invasion of the tumour by organisms is followed in most instances by necrosis, and from the septic fibroid the whole uterus may become implicated.

Ovarian Cysts or Tumours.—Any ovarian tumour may become infected in the puerperium either as the result of injury, torsion, or as an extension from infection of the uterus.

The first two of these are the commonest events. Of all the types of ovarian tumour that most liable to become infected as a result of injury during childbirth is the dermoid cyst, which more than any other is apt to be fixed in the pelvis under the head. As a result the inflamed mass is usually found lying in the utero-rectal pouch behind the uterus.

When torsion is the primary event the tumour, on the other hand, is usually well above the pelvis, and is no more likely to be a dermoid than any other variety.

Finally, when the infection is secondary to that of the uterus, neither the position of the tumour nor its histological character stands in any constant relation to the event.

SYMPTOMS.

Where the infection of the myoma is secondary to that of the uterus itself, the symptoms are those of a severe type of puerperal fever.

The uterus becomes markedly tender and signs of peritonitis over it soon appear, especially if the tumour lies close under the serous coat. Exceptionally in the case of a submucous myoma the mass may slough with exceedingly foul discharge, and eventually be spontaneously extruded, see p. 190.

In those instances in which the infection of the tumour is primary and remains limited to it, as in the case of some pedunculated fibroids, the symptoms and signs may be more localised. The tumour becomes exceedingly tender, and signs of acute peritonitis beginning in or limited to the area adjacent to it are manifest.

If torsion of the pedicle has been the first event, the mass may rapidly enlarge from vascular congestion, and in these cases the onset is sudden with violent pain.

An infected cyst gives rise to symptoms of peritonitis more or less localised in different cases.

A suppurating dermoid lying in the pelvis forms a tender, fixed,

"boggy" swelling situated behind the uterus and pressing it forwards.

Torsion of a cyst produces violent and sudden pain, often in paroxysms. The tumour rapidly enlarges and becomes very tense and tender.

All infected ovarian tumours give rise to high fever and constitutional signs.

DIAGNOSIS.

The symptoms due to an infected pelvic tumour have to be distinguished from those caused by infection of the puerperal uterus. It has been pointed out that in the case of myomata the two are often conjoined.

Where, however, the process is limited to the tumour and the uterus escapes, it will be found that the latter is neither tender nor subinvoluted, while all the symptoms and signs centre round the abnormal mass.

An inflamed myoma or ovarian tumour is to be distinguished from the swelling of salpingitis or cellulitis by the fact that in the case of the former tumours a mass is present from the very onset of the symptoms, whereas in the latter it only appears after the lapse of some days.

An extraordinary case has been recorded in which obstruction to delivery was caused by a tumour of unknown nature. Cæsarean section was performed and the mass was found to consist of a large collection of pus in the pouch of Douglas, in the midst of which was lying a swab that had been left behind at a previous abdominal operation.

TREATMENT.

This is operative in all cases. If the tumour be a myoma, the safest course as a rule is to perform total hysterectomy, because the whole uterus is usually infected as well, see p. 681.

In the case of a cyst, however, its removal alone usually suffices.

In either event, directly it is apparent that some mishap to the tumour has occurred, operative measures should be proceeded with at once.

REACTION FEVER.

After severe labours, especially in highly sensitive women, an abrupt but transient rise of temperature immediately after delivery is not uncommon. It rarely exceeds 100° F., and should fall almost immediately. Its cause is not known, but it may be analogous to

the rise of temperature occurring in athletes after prolonged exertion, and produced by the absorption into the circulation of products of muscle metabolism.

It is most important to remember that "reaction fever" is always transient. If the pyrexia is maintained for more than a few hours, suspicions of acute septic infection during labour should at once arise.

BREAST FEVER.

The painful swelling of the breasts initiating lactation may be a cause of slight fever, but pyrexia beginning on the third or fourth day always suggests sepsis of the genital tract, and this hypothesis should not be lost sight of even when the breasts are very hard and painful.

The fever produced by mammary irritation is never high; anything over 100° F. indicates a graver cause. Moreover, very tender, swollen breasts are continually seen without any fever. It is necessary to lay the greatest stress on these points, in view of the frequency with which the early signs of puerperal infection are misinterpreted as being due to the breasts.

There is, however, a form of lobular mastitis occurring early in the puerperium which gives rise to marked fever. It will be referred to further presently, see p. 541.

OTHER CAUSES OF NON-SEPTIC FEVER.

No other cause of non-septic fever is at all common in patients who previous to the labour were healthy. Constipation is credited by some with the power of producing fever in the puerperium, but seeing that it has no such effect apart from it, the fact is much to be doubted. Puerperal women are not, of course, immune to the various acute infective fevers, but their occurrence at that time is very uncommon. Influenza and scarlatina are of special importance in this connection; influenza because of the frequency with which fever subsequently proving to be septic is attributed to it, and scarlatina on account of its supposed relationship with puerperal fever. As regards influenza, it must be borne in mind that the initial symptoms of puerperal sepsis, namely, headache, fever and general malaise, closely simulate that disorder, and that the former diagnosis should never therefore be made except after strict examination and reasonable proof.

Puerperal women have been held to exhibit a special liability to scarlatina, though the fact is not proved. The causative organism

of this infective fever is not definitely known; but inasmuch as streptococci can be isolated from the throat, the possibility of conveyance of this organism is undoubted. Some forms of puerperal sepsis present a scarlatiniform rash, but such occurs in other species of toxæmias which have no possible connection with scarlatina.

Fever in the puerperium, associated with pulmonary signs, may be due to inter-current pneumonia or pleurisy, quite independent of the recent confinement; but, on the other hand, such lesions are often secondary to primary genital infection.

In short, the practitioner will do well to recollect that on mere chance alone, illness in a puerperal woman who up to the time of her confinement was in good health, is most likely to be due to the confinement rather than to some accidental cause unconnected with it.

TYMPANITES UTERI.

Physometra, or air in the uterus, is a rare condition.

CAUSE.

Air may enter the uterus during some operation, such as turning.

A more serious condition rarely is met with, in which the liquor amnii has become offensive and has mostly drained away, and gas-forming bacteria have entered the uterus. This variety is favoured by premature rupture of the membranes, and is commoner in primiparæ on account of the longer duration of labour; for similar reasons a contracted pelvis favours its onset.

SIGNS.

If air enters the uterus during some operative manipulations and the child is in distress from some interference with the placental circulation, the air may provoke it to breathe, and under such circumstances competent observers have heard the child cry.

With the more serious variety the child is dead and quickly becomes decomposed, and the patient's condition may be very grave. The distension of the uterus leads to inertia, followed perhaps by post-partum hæmorrhage. Fever may supervene before the birth of the child, and will certainly be present afterwards.

Air entering the uterus in the third stage of labour may give rise to air embolism, see p. 139.

TREATMENT.

The patient must be delivered as rapidly as is consistent with safety, and a special lookout must be kept for post-partum hæmor-

rhage. If sepsis is present it must be treated in the manner already described.

EMPHYSEMA OF THE UTERINE WALL.

A case of emphysema of the uterine wall has been described following manual detachment of the placenta. The abdomen became distended and the uterus tympanitic. Deep palpation revealed well-marked crepitation, and caused pain. The patient dying on the fourth day, a *post-mortem* examination showed the condition to be due to streptococcus pyogenes and a gas-forming bacillus in the uterine wall.

This condition would have to be distinguished from emphysematous decomposition of the fœtus.

CHAPTER XXVI.

Subinvolution and its Results.

INVOLUTION OF THE PARTS CONCERNED IN PREGNANCY AND LABOUR.

Involution in its widest sense includes all those retrogressive changes by which the parts concerned in pregnancy and labour return to the unimpregnated condition.

Thus not only the uterus involutes, but the abdominal wall, the vagina, the pelvic floor, and the supporting structures of the uterus also.

Perfect involution of all these parts is but rarely seen, though occasionally one comes across women who have borne a number of children and yet maintained an almost virginal condition of the parietes and genital passage.

The full period of physiological involution is about six weeks, but from the standpoint of obstetric practice it is usually reckoned as being complete when all blood-stained discharge from the uterus has ceased; in normal cases about two weeks after the labour.

The daily rate of involution should be marked on the temperature chart. For this purpose the 100° line is used to represent the level of the pubic symphysis, and each degree above that is counted as an inch.

The height of the fundus above the symphysis should be measured at the same hour daily and *immediately after the bladder has been emptied.* This is essential, because a full bladder elevates the uterus. It is better also to have the rectum empty.

In a normal case the fundus at the end of the third stage of labour is $5\frac{1}{2}$ inches above the pubes, and during involution the chart shows a curve the extent of whose fall progressively diminishes up to the tenth or twelfth day, after which the uterus becomes too indistinct for accurate measurements to be taken. It will be found that abnormalities in the puerperium connected with the genital tract will be reflected in the involution curve by a deviation from its usual form.

We shall now consider subinvolution of the uterus and subinvolution of the parts other than the uterus.

SUBINVOLUTION OF THE UTERUS.

CAUSES.

Failure or delay in the involution of the uterus may be brought about by several causes.

Septic infection of the uterus is at once the most important and most potent cause of subinvolution. In such cases the chart may show for many days a straight or even a slightly ascending line indicating that the musculature is either relaxing or actually swelling. Nothing is more characteristic of profound uterine infection than to find the organ after the lapse of many days at or even above the level which it occupied immediately after the labour. In certain cases, however, an overwhelming septicæmia may be present with but slight signs of infection of the uterus, and in such involution is not retarded to any appreciable extent.

Uterine sepsis, not alone of the acute variety, but in the nature of slighter infections occurring in the later days of the puerperium, and marked perhaps merely by slight purulent discharge with little or no fever, is also a cause of subinvolution.

A uterus thus hyperæmic in the later puerperium probably rarely returns to the normal size, and may pass into a condition of chronic metritis and remain a constant source of trouble. In many of these cases the corporeal endometrium is never or only temporarily affected, the cervix being the permanent seat of infection.

Apart from infection, retention in the uterus of fragments of clot or placenta also brings about subinvolution, although in some of these cases it is probable that a primarily inert condition of the uterine musculature produces retention.

Retroversion of the uterus during the puerperium is markedly associated with subinvolution. The causes of this displacement are considered in the next section.

It is generally stated that "getting up too soon" is a cause of subinvolution. It is, however, very doubtful if such is the case. The prolonged maintenance of dorsal decubitis favours retroversion, which in its turn produces subinvolution. Further, drainage from the uterus is less free than in the standing, sitting, or squatting postures, and there is a greater liability to the retention of blood clot in the uterus. Finally, undue immobility in bed favours muscular and circulatory atony, both of which militate against involution, which is a process of retraction and absorption. With this knowledge we have allowed patients to get out of bed long before the usually accepted period, and have not had reason to regret our action.

Women who nurse their children are less likely subjects of sub-

involution than those who do not, for suckling powerfully stimulates uterine retraction.

A flabby uterus accompanying the naturally flabby condition of the tissues of certain women is no doubt a cause of subinvolution. The materials of which the human body is composed vary greatly in quality in different persons. Thus, one woman having had a dozen children may scarcely show a mark on the abdominal wall, whilst in another a single pregnancy leaves the parietes in a condition resembling crinkled paper.

SYMPTOMS AND SIGNS.

On abdominal palpation the uterus is found to be larger and softer than normal; in septic cases it is most often tender. The lochia remains bloody, is excessive or too long-continued.

RESULTS.

While sepsis is the principal cause of subinvolution, the latter itself predisposes to sepsis, see p. 482. Sepsis is not, however, necessarily an accompaniment either as a cause or effect, for extreme subinvolution may occur from retention of a piece of placenta without any infection taking place.

A subinvoluted uterus is liable to retrovert in the puerperium. In this event, complete involution is very unlikely to occur, the uterus remaining permanently bigger than normal.

The later history of a subinvoluted uterus is usually that of chronic cervicitis with or without retroversion. The patient suffers from excessive loss at the menses, leucorrhœa, backache, and sensations of bearing down and weight. In many cases the permanently enlarged uterus is in addition prolapsed and associated with the deformities that result from subinvolution of the parts other than the uterus that are concerned in pregnancy and labour, see p. 529.

TREATMENT.

Subinvolution of the uterus is to be prevented by strict asepsis and antisepsis during the labour, and by ensuring an empty and well-retracted uterus at its close, see p. 482. The practice of giving ergot during the puerperium has much to recommend it, for while no doubt perfect involution will occur in the majority of cases without it, there are others in which the uterus from local atony and constitutional feebleness tends to remain permanently too large.

Wherever marked atony of the uterus has been present during the labour, or where the patient was known to have an unduly large and possibly retroverted uterus before she became pregnant, the use

of ergot during the puerperium is strongly indicated. It is difficult to say how long after confinement ergot is capable of aiding diminution in size of the uterus. It certainly has no effect in this direction apart from fairly recent delivery. It may be taken roughly that after six weeks the size of the uterus is incapable of being influenced by ergot.

The drug, if used in the puerperium, should be administered in 30-min. doses in combination with strychnine and a dilute acid, thus: Ext. Ergotæ Liq., ♏ xxx; Liq. Strychniæ, ♏ v; Ac. Hydrochlor. Dil., ♏ v; Aq. ad 1 oz.; t. d. s.

In regard to the length of time a patient should stop in bed, it would appear that those who advocate early rising have no more cases in subinvolution than those who keep their patients in bed for two or three weeks.

It is probable that there is a period peculiar to each individual during which it is proper she should rest after labour, and which is naturally determined by the feelings of the woman herself. The arbitrary period of ten days is no doubt a generally sound one, but there are many patients who could with advantage get up much earlier than this.

Given a well-retracted and empty uterus to begin with, it is probable that involution will go on satisfactorily, quite irrespective of the position of the patient. Each case must be judged on its merits. Many enfeebled women, especially of the lower classes, are benefited by a good rest in bed quite apart from their recent labour. To these poor things the puerperium is a period of mental and physical repose such as they get at no other time in their hard-worked lives. On the other hand, it is undesirable to treat as a severe illness a normal confinement in a young and robust woman.

Presuming that subinvolution is present, its curative treatment will depend on its cause. If this be sepsis, the measures described on p. 485 are indicated.

In a case where no signs of infection are present, but with excessive or too long-continued loss, the uterus persistently remains unduly large, the best course is to explore it under an anæsthetic in the manner described on p. 486.

In the earlier days of the puerperium it is probable that some gross cause for the condition will be found, such as a mass of retained conception products or blood clot.

There is another type of case, however, in which slight bleeding goes on persistently into the fourth week or longer. In such the cervix must be dilated and the cavity explored with the finger, after which it should be lightly curetted with a blunt flushing curette.

In many of these cases no gross mass of retained products or blood clot will be found, but nevertheless the operation invariably stops the bleeding. In some of these cases the uterus is retroverted.

These patients can also be treated with ergot, but its use should be limited to those in which the uterus is in a normal position and the undue enlargement but slight.

Old-standing cases of subinvolution pass into the category of gynæcology. In such the uterus is permanently enlarged, and in many cases also retroverted.

SUBINVOLUTION OF THE PARTS OTHER THAN THE UTERUS.

CAUSES.

If the abdominal wall is not well supported during pregnancy and the lying-in period, subinvolution of this part may result.

The corsets habitually worn by the poor, compressing the waist and leaving the lower abdominal wall devoid of all support, tend strongly to the production of pendulous belly.

Subinvolution of the ligaments and sustentacular apparatus of the uterus is a matter of natural tissue weakness in many cases. In others, however, it is the result of over-stretching during labour or the puerperium. As an example of the former, the effects of forceps delivery of the head through an imperfectly dilated cervix may be cited. As regards the latter, a subinvoluted uterus heavy with retained blood clot exercises abnormal traction, especially when retroverted.

Subinvolution of the vagina and pelvic floor, while again often due to natural tissue weakness, is strongly predisposed to by over-stretching. Thus it is most common after severe labours, involving the rapid extraction of a large head through a relatively narrow vagina, especially if the perineum be permanently destroyed as well. The importance of endeavouring to place the head in a favourable position before applying forceps and the necessity for judgment in the exercise of force may here be emphasised.

RESULTS.

Failure of the abdominal wall to involute produces pendulous abdomen, with enteroptosis and the various pains and disabilities consequent thereon.

A permanently relaxed and enlarged vagina tends to evert, producing cystocele and rectocele, and this is the more likely to happen if, in addition, the pelvic floor and the sustentacular structures of the uterus and vagina are also weak and elongated.

Relaxation of the vaginal outlet permits of the descent of the already too redundant anterior vaginal wall by depriving it of support.

A loose condition of the pelvic fascia and the muscles of the pelvic floor aids the eversion of the vagina, and permits the bladder to prolapse between the divaricated edges of the levatores ani muscles.

An elongated state of the ligaments of the uterus is followed by retroversion. If, in addition, those supporting the upper part of the vagina are also loose, the latter canal tends to evert from above downwards, carrying the uterus with it, and uterine prolapse (so called) is the result.

All these conditions usually occur more or less together, and form a clinical type very commonly met with in gynæcological practice.

It may be noted that the end-results of subinvolution vary in the rapidity with which they declare themselves. All of them may appear within a few months or even a few weeks of the labour. More frequently, however, the yielding of the parts goes on over several years before the displacements described are sufficiently marked for the patient to complain of them.

TREATMENT.

Subinvolution of the abdominal wall can be prevented or minimised by supporting the abdomen during pregnancy and the puerperium by suitable appliances. During pregnancy a specially-made corset or belt may be worn. Directly after delivery, firm compression of the abdomen should be obtained by the "many-tail" bandage of abdominal surgery, which when properly made gives far more efficient support than the time-honoured towel-binder.

When the patient rises from bed a well-fitting corset with straight busks carried well down over the pubes should be worn. The modern straight-fronted corset fulfils these requirements well enough as long as the front is not carried up too high, the object to be attained being that the maximum pressure should fall on the lower abdominal wall. The corset is rendered more efficient if a couple of narrow straps which buckle across the middle line are attached to its lower part, one on either side. The tone of the abdominal muscles can be improved by massage and exercises devised to strengthen them.

Prevention of subinvolution of the ligamentary structures is to be sought in the avoidance as far as may be possible of the causes leading up to it.

Given that subinvolution of the ligamentary structures, the pelvic floor and the vagina is present, its treatment will depend upon the period after labour at which it declares itself.

In some cases the patient notices the abnormal drag and falling of the parts as soon as she stands on her feet. In such a case a vaginal examination must be made in the standing posture. If retroversion of the uterus be found, it must be treated in the manner described on p. 532.

In others abnormal descent of the anterior vaginal wall or of the cervix itself will be found.

Such cases should be sent back to bed for a further week or two, by which time it may be found that the resiliency of the tissues has recovered itself.

The immediate introduction of an ordinary self-retaining pessary is undesirable, because nothing but a very large one will fit the vagina, and this, though it maintains the parts, tends to render the laxity of the vagina permanent by preventing any further shrinkage. If a pessary must be worn, an indiarubber cup-and-stem or ring-and-stem supported by straps to the waist-band is preferable, because it does not stretch the vagina.

This pessary, however, is not intended to be worn permanently, but is used like a splint, *i.e.*, as an appliance for the temporary correction of a deformity pending the time that nature makes it permanent. A pessary thus used may usually be dispensed with in from six weeks to three months.

Plastic operations on the vagina or uterus should not, as a rule, be undertaken until at least six weeks have elapsed since the labour, in order that the natural involution of the parts shall be consummated as far as may be.

RETROVERSION OF THE PUERPERAL UTERUS.

Retroversion of the uterus in the puerperium does not occur until after the first week, because up to that time the organ is too large to accommodate itself in the pelvis.

CAUSE.

The condition is usually due to subinvolution either of the uterus, the broad ligaments, or both, but in some cases where the displacement has existed before pregnancy, the organ returns to its backward position without any signs pointing to deficient involution.

As a rule, however, it may be said that a uterus which retroverts

in the puerperium is subinvoluted, and will remain so if not treated.

SYMPTOMS AND SIGNS.

The lochia remains red, or may even be excessive in quantity. On examination, the uterus cannot be felt from the abdomen except by deep pressure, while from the vagina it is found lying in the hollow of the sacrum both retroverted and retroflexed.

When the patient gets up, she complains of a bearing-down feeling and backache, and not infrequently of pain referred to the lower abdomen.

DIAGNOSIS.

The condition must be distinguished from a soft tumour lying behind the uterus. If, on bimanual examination, the body of the uterus is absent from its normal position, and the cervix is found to be pointing forwards and perhaps a little upwards, the body felt in Douglas's pouch is likely to be the uterus. If, on the other hand, the fundus can be felt bimanually, and the cervix is in its normal position looking downwards and backwards, the swelling in Douglas's pouch is a tumour.

TREATMENT.

The cases which are discovered early in the puerperium are those in which the misplacement is associated with undue or too long-continued hæmorrhage from the uterus.

The course in these cases is clear. The patient should be anæsthetised, and the uterus explored with the finger and its position rectified. After this, a hot intra-uterine douche should be administered, and an injection of ergotin given to promote firm retraction. The forward position should then be maintained by packing the vagina from the anterior vault downwards, the tampons being removed in thirty-six hours.

Dorsal decubitus is to be avoided, and the patient should either lie on her face or sit up during the rest of her stay in bed. A pessary is undesirable, because of the large size required to fit the vagina, see p. 531.

Where the displacement is not discovered until three or four weeks after labour, the treatment will depend on whether it is giving rise to symptoms or not.

If there is abnormal hæmorrhage, this must be treated in the manner just described, except that the use of the curette will be required to supplement the finger, see p. 228.

In the absence of hæmorrhage, no operation is required; but where pain is complained of, the uterus should be rectified either by the bimanual method or by the help of a sound, and retained in the anteverted position by a ring or Hodge pessary.

The position of the uterus should be verified next day, because, unless the pessary succeeds in maintaining the anteversion, it is useless and should be removed at once.

If the position is satisfactory, the instrument should be left *in situ* for three months, the patient douching herself twice daily with a weak antiseptic solution in the meantime. At the expiration of that period, presuming the uterus has remained forwards, the support may now be removed, as by that time satisfactory involution of the ligamentous structures should have occurred.

In replacing the uterus, it is absolutely necessary to bring it into a position of complete anteversion, for if any intestine remains between it and the bladder, a return of the displacement is inevitable.

The pessary chosen should be of the fullest size that the vagina admits of, so that the anterior vaginal wall is slightly stretched. Not infrequently the uterus, though easily *replaceable*, is not *retainable* by any instrument. Under these circumstances, the use of a pessary is foolish. It should be the object of the practitioner to dispense with artificial supports as soon as possible.

Finally, in the case of retroversion giving rise to no symptoms, and discovered accidentally some three or more weeks after the confinement, the best practice is to let it alone.

AFTER-PAINS.

CAUSE.

After-pains are more common in multiparæ, since contraction and retraction of the uterus is not in them so well maintained, and some women seem specially prone to them.

They are especially severe if the uterine cavity contains placental fragments, portions of chorion or blood clot.

DIAGNOSIS.

After-pains are spasmodic in character, and are most marked the day following labour. The uterus is not tender, and during the pain can be felt to harden. After-pains are increased by putting the child to the breast.

Continuous pain suggests something gravely amiss with the uterus. The latter should be thoroughly examined in all cases where by reason of the severity of the pains and the presence

of untoward symptoms, something more than mere after-pains are suggested. Very severe spasmodic pains accompany gradual inversion of the uterus or extrusion of a myoma.

TREATMENT.

After-pains when slight require no treatment.

If severe and accompanied by undue hæmorrhage, the uterus should be explored under an anæsthetic.

When not so accompanied and in the absence of all other untoward signs, they may be treated by ergot, by sedatives such as the opium, chloral, and bromide mixture mentioned on p. 292, or by a hypodermic injection of morphia.

Ergot will be most successful if the pains are due to the retention of a blood clot.

CHAPTER XXVII.

Anomalies and Diseases of the Breast.

ECZEMA OF THE NIPPLES DURING PREGNANCY.

CAUSE.

This condition is more likely to occur in women with flattened or inturned nipples. In some cases it has pre-existed the pregnancy.

TREATMENT.

The nipple should be bathed several times a day with boracic lotion, carefully dried and then powdered with a mixture of boric acid, 1 part; zinc oxide, 2 parts; and Fuller's earth, 3 parts.

If the eczema is not cured before the birth of the child, nursing must be prohibited.

DEPRESSED NIPPLES.

CAUSES.

Depressed nipples are either congenital or the result of corset pressure. The most marked cases are the former. Some inverted nipples readily evert with erection or traction, but in others the deformity is permanent under all circumstances.

Functional inactivity of the gland is common where the depression is extreme.

RESULTS.

Extreme depression of the nipple contra-indicates breast feeding. In most cases the child, after futile attempts, refuses to suck, but should it persist it is certain in a very short time to cause excoriation. This is due, first, to the fact that the child sucks at the nipple rather than through it; and, secondly, because the depression leads to a continual damp and macerated condition of the epithelium, which, becoming soddened, is readily detached.

It is impossible to keep an inverted nipple clean, and hence, if excoriation occurs, an infected wound difficult of access almost surely follows.

FLATTENED NIPPLES.

Some nipples, though not actually depressed, are *flattened*, so that the child has difficulty in holding them. The condition, if

present, is particularly obvious in the first few days of nursing, because it is accentuated by the tense condition of the breast. The excessive efforts made by the infant tend to excoriation of the nipple. If, however, nursing can be persisted in, the condition often improves as the breast becomes more relaxed.

TREATMENT.

The practitioner should never neglect to examine the condition of the nipples when the patient comes to engage him for the labour. When the deformity is marked she should be advised not to attempt breast feeding.

In the slighter degrees of depression, improvement may be effected by drawing out the nipple several times daily during pregnancy by the use of a breast-pump or the finger.

At the outset of suckling the task of the child is rendered easier by withdrawing a little milk with the breast-pump beforehand, so as to render the breast more lax.

The greatest care must be taken to keep the nipples clean and dry, and if they become sore they must immediately be treated (see below). If, in spite of this, they refuse to heal, suckling must be given up. Not infrequently one nipple alone is at fault. If this is the case the breast on the other side should alone be used.

If the practitioner has decided beforehand that suckling is undesirable, the breasts should be firmly bandaged on the day after labour. For this purpose a broad "domette" or elastic crêpe bandage should be employed, applied in the figure of 8.

Before the breasts are bandaged they should be brought to the front of the chest with a gamgee tissue pad placed over each, and a pad should also be placed between the breasts and over each shoulder. The bandage should be fixed as tightly as the patient can bear, and readjusted whenever it appears loose. It should be worn for a week at least, and if during the third or fourth day there is much pain from tension, it is better to relieve this by the use of a hypnotic rather than loosen the bandage. In most cases in which the bandage has been applied directly after labour no great suffering is entailed.

It is otherwise, however, where the child, having begun to suckle, is withdrawn from the breast. Here the tension due to the congested state of the organ may be so great that the patient cannot tolerate any pressure.

In such cases warm boracic fomentations should be applied at first until the tenderness has subsided, when the bandage may be applied as before.

It is inadvisable to use the breast-pump to relieve the tension, because, although it temporarily effects this, it stimulates the secretion which it is desired to suppress. The tension, however, may cause such agony that the milk has to be drawn off once before the bandage is applied.

Saline purgatives are usually given to assist the disappearance of the milk. Patients are sometimes advised to abstain from fluids to the same end, but this a quite unnecessary hardship.

Iodide of potash, preferably in two or three large doses of 30 grains, may be tried.

SORE NIPPLES.

The nipples when sore may either be excoriated or cracked.

CAUSES.

The nipples may become sore through:

The epithelium covering them being too soft or soddened.

The act of suckling being too vigorous or too difficult.

Malposition of the child.

Disease of the child or mother.

Soft or Soddened Epithelium.—The nipples of women who have never nursed before are naturally softer than those who have.

If the nipples are not properly cleaned during pregnancy, crusts may be formed by the dried secretion and the epithelium become damaged underneath, so that when suckling is attempted soreness results.

As has been pointed out, the epithelium covering depressed nipples tends to be soddened and easily detachable. The same result follows neglect to clean and dry the nipple after suckling.

Lastly, leaving the nipple for an undue length of time in the infant's mouth damages the epithelium.

Suckling too Vigorous or too Difficult.—If the supply of milk is inadequate either in quantity or rate of flow to satisfy the child, it is apt to suck excessively hard. This is particularly the case in the first three or four days of the puerperium.

When the nipple is inverted or flattened the child is apt to make unduly vigorous efforts to retain it in its mouth.

Malposition of the Child.—If the mother holds the child in such a position that the nipple does not readily drop into its mouth, the efforts to catch hold of the nipple, and to retain it when caught, may damage the epithelium.

If the mother holds the child against her breast without depressing the breast tissue on each side of the nipple with her first and second fingers, the nostrils of the child will be ob-

structed, and it will be constantly having to let go the nipple to get breath.

As a general rule, one or more of these causes are combined in the production of sore nipples.

Disease of the Child or Mother.—Thrush when affecting the child's mouth may be conveyed to the nipples, or they may be the subject of syphilitic ulceration.

RESULTS.

The immediate result of a cracked or excoriated nipple is acute pain to the mother; in fact, so agonising can it be that she may refuse to nurse her child, or, short of this, the attempt to nurse may produce a marked nervous condition accompanied by a rise of temperature.

If the nipple bleeds, the child will swallow the blood and subsequently vomit it or pass it per anum.

The most serious complication is infection of the wound, an event particularly liable to happen if the nipple and the child's mouth be not properly attended to.

As a result, a superficial eczematous condition may be established, from which the infection may subsequently spread along the ducts and produce an acute parenchymatous or lobular mastitis.

Where the lesion takes the form of an infected crack, lymphatic dissemination of the organisms into the deeper parts of the breast may occur, with acute intestitial mastitis as a result.

The state of the nipple may lead to infection of the child's mouth, and subsequently of its whole gastro-intestinal tract.

TREATMENT.

Preventive.—During pregnancy the nipples should be carefully washed twice daily, and all crusts of dried secretion and dead epithelium thus removed. Towards term, the nipples may be hardened by bathing them twice a day with eau de Cologne or spirit diluted with a little water. Pregnant women should avoid corsets which tend to flatten the nipples.

It is at the outset of suckling that the chief care has to be exercised, for most excoriations and cracks are produced in the first fortnight. The nipples should be bathed with boracic acid solution after each application of the child to the breast, and thoroughly but gently dried. The child's mouth should be wiped out with the same solution both before and after feeding.

Until the milk is secreted, the child should only be put to the breast for a few minutes three times a day.

During the period of congestion the tension is better relieved by

the use of the breast-pump and warm boracic fomentations than by frequent suckling, especially if the latter gives pain.

There is a tendency on the part of nurses to endeavour to hasten the period of established suckling by starting regular two-hourly feeding so soon as the breasts begin to swell. This is a mistake, for the flow of milk does not appear till some days later, with the result that the child gets but little nourishment, while the mother endures much pain.

An infant for the first week of life will subsist on very little milk if water be supplied it. This may be done by the medium of a spoon or a feeding-bottle.

Directly suckling begins to cause pain, the child should be withdrawn from one breast and applied to the other. The mother should be instructed that it is mistaken heroism to endure distress under these circumstances, and that such a course if persisted in will lead to necessary abandonment of nursing altogether.

In this way, by humouring the breasts, a painless and easy suckling may be at last attained, even in cases which at first appeared unfavourable.

Curative.—If in spite of this care a crack or abrasion appears, the treatment will depend upon whether the case is a slight or severe one.

Slight Cases.—Apply to the nipple a piece of gauze soaked in a solution of biniodide of mercury (1 in 1,000), the nipple being carefully washed each time before the child is put to the breast. The nipple shield may be used.

Severe Cases.—The child should be taken from the breast for two or three days, whilst appropriate treatment is tried, the milk being drawn off meanwhile by the breast pump, or if this is too painful, by massage.

During the time the affected nipple is being rested, its breast should be firmly bandaged and the child must be fed with the other breast, and if this proves insufficient, bottle feeding must be employed in addition.

The crack or excoriation may be treated by compresses of biniodide of mercury (1 in 1,000) or the application of boracic acid and glycerine, carbolic acid (1 in 20), compound tincture of benzoin, or solid silver nitrate.

Finally, in the last resort where the lesions refuse to heal, or persistently recur, and where the health of the child is suffering, breast feeding must be given up.

In such a case the breasts must be treated in the manner described under the head of Flattened Nipples, p. 535.

INFLAMMATION OF THE NIPPLE.

As a result of an infected crack or abrasion, the whole nipple may be inflamed, swollen, and very tender. In other cases a surface eczematous condition is present, with a serous or sero-purulent discharge.

This condition may form a starting-point for deeper infection.

TREATMENT.

The child must be at once withdrawn from the breast and warm antiseptic fomentations applied until all purulent discharge has ceased. The surface should then be bathed several times a day with an antiseptic solution, and kept powdered with boracic acid, 1 part, zinc oxide, 2 parts, Fuller's earth, 3 parts, and covered with a pad of cyanide gauze.

ENGORGED BREASTS.

During the first three or four days before proper secretion of the milk is established, the breasts in some cases become very engorged.

SYMPTOMS AND SIGNS.

The mother complains of heaviness in the breasts, followed by pain which, if the condition remains untreated, becomes very acute, and may cause a rise of temperature, see p. 522.

The breasts gradually become tender, larger, more knotty, shiny, and tense, and when supported by the hand are found to be very heavy. There is often tenderness all over the breasts, and in the axillæ from swollen glands there. Mastitis is predisposed to.

TREATMENT.

A degree of engorgement is, of course, natural. When excessive it should be treated by gentle massage towards the nipple, the fingers being lubricated with sterile vaseline. In the intervals between the massage warm boracic fomentations should be applied. If the child sucks ill the breast-pump may be used, provided it does not give pain. It is useless to apply vigorous suction if no milk is ready to be secreted.

ACUTE MASTITIS.

CAUSE.

Inflammation of the breast in a nursing woman is practically always due to infection through the nipple. Though the mammary gland is normally sterile, it would appear that the main ducts

opening out on the nipple contain organisms, for it is shown that if milk be withdrawn in successive portions, there is a progressive diminution in the number of organisms found in each portion, indicating that they are being washed out of the main ducts. These organisms are, however, of very low virulence, and under ordinary circumstances do no harm.

In septic states of the nipple following abrasions or cracks, an ascending infection of the ducts is apt to occur which, penetrating

FIG. 161.—"Flushed Breast."

to the deeper parts of the gland, sets up a lobular or parenchymatous mastitis.

Less commonly the infection may spread by lymphatic conduction from an inflamed crack to the cellular tissue of the gland and produce an interstitial mastitis.

VARIETIES.

Flushed Breasts.

The pathology of this condition is uncertain.

The appearance and distribution of the lesion suggest infection of the lymphatic area near the nipple.

The organisms producing it must be virulent to account for such sharp symptoms.

SYMPTOMS AND SIGNS.

The onset is quite sudden from the sixth to the twelfth day. The patient complains of symptoms of fever and of pain in her breast.

The temperature rises abruptly. In about twelve hours from the onset a pink flush appears in some part of the breast. It is wedge-shaped and has its apex at the nipple. The tissues underlying this area are slightly swollen, tender and indurated.

As a rule it subsides almost as quickly as it appeared, and the breast is well in forty-eight hours with appropriate treatment. We are not acquainted with any cases in which suppuration has taken place (Fig. 161).

DIAGNOSIS.

"Flushed breast" owing to the acute onset of the fever may suggest infection of the puerperal uterus, a mistake particularly likely to occur if the breast is not examined.

TREATMENT.

The child must be withdrawn temporarily from the breast, fomentations applied, and the bowels well opened.

Parenchymatous Mastitis.

The infection takes place *viâ* the ducts in most cases, and is almost invariably secondary to an inflamed nipple. It is rarely seen until a fortnight or more has elapsed since the birth of the child.

SIGNS.

It begins as a deep-seated tenderness and firm swelling, over which the skin subsequently reddens. There is great pain over the breast, and in the corresponding axilla the glands are swollen and tender.

In most cases there is a good deal of constitutional disturbance, accompanied by a rapid pulse and a high temperature; a rigor may occur.

RESULT.

Under treatment the inflammation may subside without suppuration, but an abscess forms most commonly, the pus tracking in several directions.

In bad cases the breast may become riddled by abscesses or the entire gland may slough.

TREATMENT.

Acute mastitis is in nearly all cases due to neglect of the nipples. Where the precautions described on p. 538 are properly carried out, it will rarely or never occur. At the first appearance of symptoms the child must be withdrawn from the breast, which must be supported by a bandage or sling. In the earliest stage an evaporating lead lotion gives relief, and may assist in aborting the inflammation. Later on, warm boracic fomentations should be applied, and as soon as a definite focus of swelling is apparent,

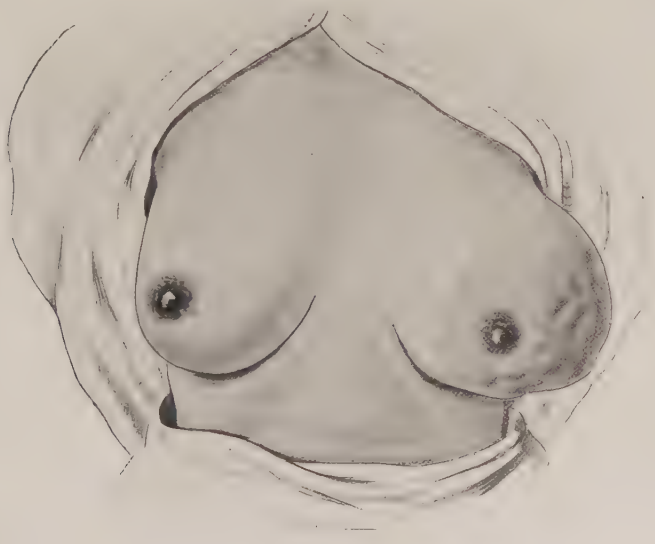


FIG. 162.—Galactocele.

this should be deeply incised without waiting for the obvious formation of pus. If pus is evacuated, the finger should be passed into the abscess cavity, and if it is large and its lower level is below that of the incision, a director should be passed down to its lowest point and a counter incision made, after which a drainage tube should be inserted for a few days.

In bad cases multiple incisions are necessary in directions radiating from the centre. Fomentations should then be continued until all discharge has ceased.

If chronic suppuration becomes established, with multiple sinuses, these should be freely opened up, scraped, and packed with gauze, and afterwards syringed out several times a day with hydrogen

peroxide, 10 volumes. In exceptional cases where the whole gland is destroyed, it may even be desirable to amputate the breast.

If the pain is very great, sleep must be given by hypnotics. The child may be nursed from the opposite breast in the slighter cases; but when the condition is severe, it is better to wean it and bandage the unaffected breast.

Submammary Abscess.

This rare condition of inflammation in the connective tissue behind the gland is usually due to extension from parenchymatous mastitis.

The collection of pus is likely to be large, and pushes the whole breast forwards.

The patient has the usual symptoms of fever, general malaise, headache, rapid pulse, and increase of temperature, while there is deep-seated tenderness and œdema over the breast.

TREATMENT.

A submammary abscess must at once be opened at its most dependent part.

GALACTOCELE.

A galactocele or milk cyst is the result of inflammatory occlusion of one of the milk ducts. It presents as a large, reddish-coloured, fluctuating swelling which resembles a large abscess but for the fact that the symptoms are not sufficiently severe (Fig. 162).

TREATMENT.

It should be freely incised. The contents are milk, with an admixture of pus and a good deal of free fat. A drainage tube should be inserted into the cavity, and retained there till all discharge has ceased, when it should be allowed to granulate up.

GALACTORRHŒA.

Galactorrhœa is a constant escape from the nipple of a thin watery milk in large quantity. One or both breasts may be affected.

This is a phenomenon occurring late in lactation, usually after weaning, and its causation is unknown.

TREATMENT.

It is intractable to drugs either internally or externally applied. It should be treated by bandaging the breast or breasts exceedingly firmly, see p. 536.

To satisfactorily do this, it will probably be necessary to keep the patient in bed, for it is, as a rule, impossible to keep the bandage tight if she is up and about.

ABNORMAL COLOUR OF THE COLOSTRUM.

In a recorded case the colostrum was found to be black before term. As full time drew near the colour gradually changed to a red-brown and then to red, and disappeared two weeks after birth of the child. On microscopical examination, amorphous granules were detected, but no bacteria. Lactation was not disturbed. The colour was thought to be almost certainly hæmatemic.

Colostrum of a reddish-chocolate colour has been noted in a primigravida nine days before term. The breasts remained well till the seventh day of the puerperium, and then began to distend and eventually an abscess was formed.

The organism found was staphylococcus aureus.

HYPERTROPHY.

Enormous hypertrophy of the breast sometimes occurs during pregnancy, and produces such pain and discomfort that amputation has to be resorted to.

Lesser degrees of this abnormality should be treated by suitably slinging the breasts by means of bandages, or by a fashioned support.

CARCINOMA.

Carcinoma of the breast occurring during pregnancy or lactation is extremely malignant. The tumour grows at an exceptional rate, and soon attains a large size.

The whole breast is enlarged, and presents a tumid appearance at first sight strongly suggestive of inflammation. The axillary glands rapidly become involved.

The nipple in these cases is retracted or flattened, the whole breast is hardened, and the skin has the characteristic "pigskin" aspect of lymphatic œdema (Fig. 163).

DIAGNOSIS.

It is of the highest importance to realise how closely acute carcinoma of the breast may mimic the appearance of mastitis.

In making a diagnosis during pregnancy the practitioner should remember what an extremely unlikely complication unilateral mastitis is at this period, and further, he should bear in mind that an

inflamed breast is tender, whilst one the subject of acute carcinoma can be handled freely. Indeed, the singularity of an appearance of acute inflammation with complete absence of tenderness, in the case of any part or organ, should always arouse suspicions of new growth.

The liability to mistake carcinoma for mastitis is still greater during lactation, because the latter condition is so commonly met with during that period. Here, again, the relative or complete

Fig. 163. Carcinoma Mammæ in a Nursing Woman.

absence of pain and tenderness should immediately put the medical man on his guard.

TREATMENT.

Immediate extirpation of the growth by the modern radical method is the proper course. If doubt as to the correctness of the diagnosis is present, the swelling may be first incised. The exploratory wound should, of course, be closed, and all the instruments used in making it should be laid aside before the surgeon proceeds with the major operation.

CHAPTER XXVIII.

Pregnancy in Abnormal Situations.

A FERTILISED ovum may become arrested at the following situations: 1, the cervix (this is questionable); 2, the lower uterine segment (placenta prævia); 3, the junction of the upper and lower

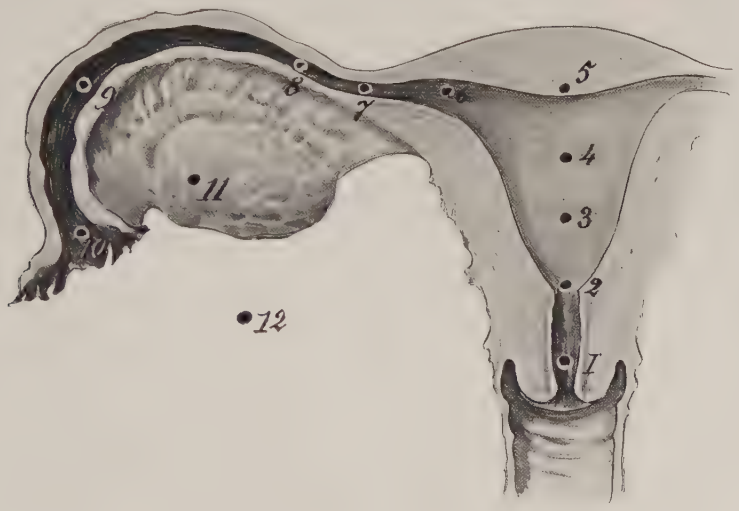


FIG. 164.—The Sites of Implantation of the Ovum.

uterine segments; 4, the upper segment; 5, the fundus; 6, the cornu (angular pregnancy); 7, the interstitial portion of the tube; 8, the isthmic portion of the tube; 9, the ampullary portion of the tube; 10, the fimbriated extremity; 11, the Graafian follicle; and 12, the peritoneum (Fig. 164).

TUBAL GESTATION.

CAUSE.

The reason why the ovum develops in the tube and not in the uterus is unknown. There are many theories, but no proof. The one clinical fact of importance from an etiological point of view is that the accident is much commoner in women who are childless or who have not had any children for some long time.

PATHOLOGY.

The dangers of tubal gestation are entirely associated with the environment of the ovum.

When the fertilised ovum reaches the uterus, complementary changes are set up in the endometrium and muscle, so that in the first a thick decidua is formed, and in the second the muscular coat becomes remarkably hypertrophied. When the fertilised ovum is arrested in the tube, there are no such complementary changes: the lining of mucous membrane becomes no thicker, the muscular coat does not hypertrophy.

When the fertilised ovum reaches the uterine cavity, it bores its way into the decidua by means of the trophoblastic elements of its chorion.

FIG. 165.—Diagrammatic Cross-Section of Unruptured Tubal Gestation. The Gestation Sac is situated in the Tube Wall.

The ovum only penetrates a certain distance, and as the decidua is thick the ovum comes to rest whilst still surrounded by this membrane, and there continues to develop.

It has been shown that exactly similar phenomena occur when the fertilised ovum is arrested in the tube, but with this most important difference, that the mucous lining being so thin, the oösperm bores its way right through this membrane into the muscular coat and in it continues to develop. It lies here in a space called the "gestation sac," the periphery of which consists of a mass of cells derived from the ovum and called the "trophoblast," which have the property of producing lysis of the maternal tissues with which they come in contact (Figs. 165 and 166). The products of this tissue destruction form the pabulum of the growing gestation until such time as a system of chorionic villi can be developed, and nutrition by destruction give place to nutrition by transudation.

Running in the muscular wall of the tube are numerous vessels, and it is the erosion of these by the trophoblast and the thinning of the muscular coat by destruction and distension that constitute the chief dangers of tubal gestation.

One of the following events may follow the arrest of a fertilised ovum in the Fallopian tube:

Rupture of the tube.

Formation of a tubal mole.
Erosion of the tube.

Rupture of the Tube.

Rupture of the tube is determined by a sudden gush of blood into the gestation sac from a maternal vessel opened up by the tropho-

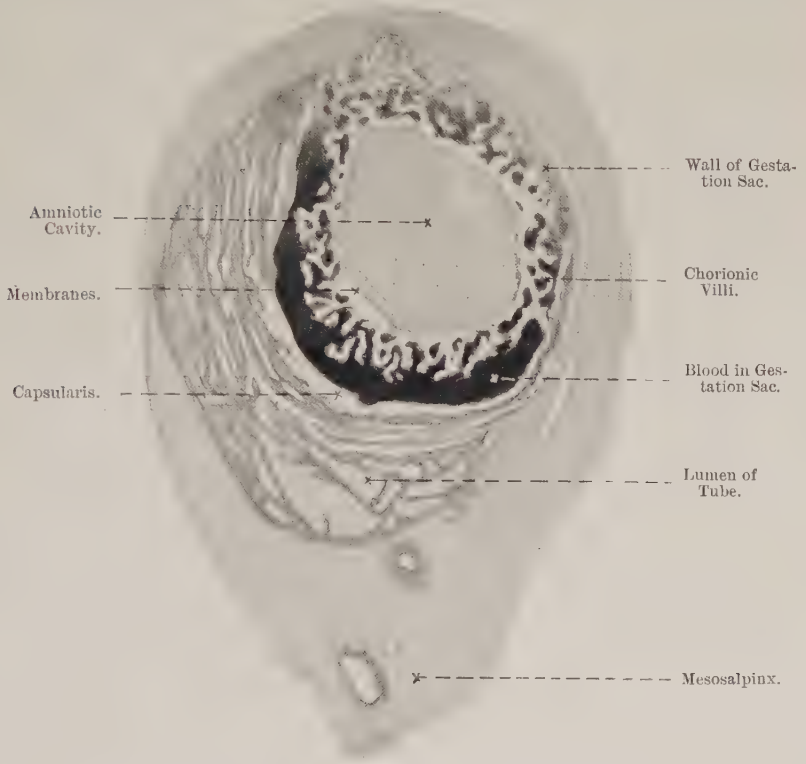


Fig. 166.—Cross-Section of the Tube in Unruptured Tubal Pregnancy. From a Specimen in the possession of Mr. T. G. Stevens.

blast. There are three varieties of rupture: Intra-mural, extra-tubal, and intra-tubal.

Intra-mural Rupture.—Intra-mural rupture may be likened to an aneurysm sac becoming diffuse; the blood extravasates along the muscle planes of the tube wall and excavates for itself a cavity of considerable size (Fig. 167).

Sufficient blood having accumulated, it either bursts out of the tube, or into the lumen of the tube, or in both directions, carrying perhaps the ovum with it.

Extra-tubal Rupture.—Extra-tubal rupture is most often seen

when the gestation is implanted in the isthmic segment of the tube, because here the lumen is relatively very small. The blood and gestation may escape out of the tube either into the peritoneal cavity or into the broad ligament.

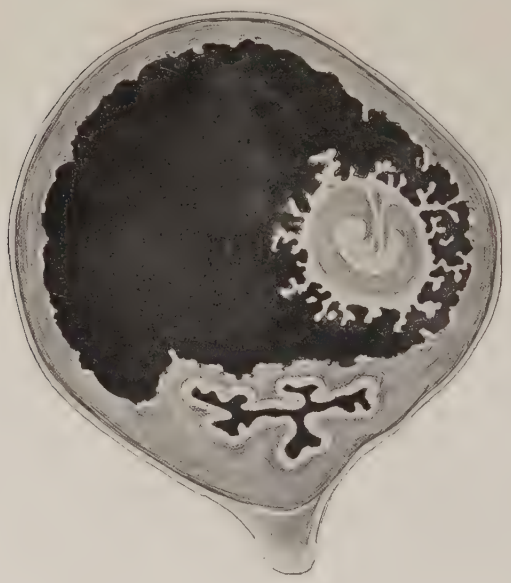


Fig. 167.—Intra-mural Rupture. The Gestation Sac is distended with effused blood.

Primary Intra-peritoneal Rupture. — In this case the blood bursts through the peritoneum covering the tube, and escapes into the peritoneal cavity (Figs. 168 and 169). Diffuse hæmoperitoneum or a localised pelvic hæmatocele results.

The ovum perishes in nearly all instances.

Primary Extra-peritoneal Rupture. — In this case the blood bursts through the floor of the tube, and escapes between the boundaries of the broad ligament (Fig. 170).

The hæmorrhage is then arrested or slowed, owing to the limited space into which the blood is extravasated. Sudden death, therefore, from great hæmorrhage is never met with as it is an intra-peritoneal rupture. The result is the formation of a pelvic hæmatoma.

The ovum perishes in most instances.

Fig. 168. — Primary Extra-peritoneal Rupture of the Gestation Sac.

Intra-tubal Rupture (Tubal Abortion).—In cases of intra-tubal rupture the gestation sac bursts into the lumen of the tube, usually in the ampullary segment, and the blood escapes into the lumen of the tube (Fig. 171), and is then expelled through the abdominal ostium if this be patent. If not, it accumulates in the tube to form a hæmato-salpinx.

In some cases the gestation is extruded from the gestation sac into the lumen of the tube, and from thence may or may not be

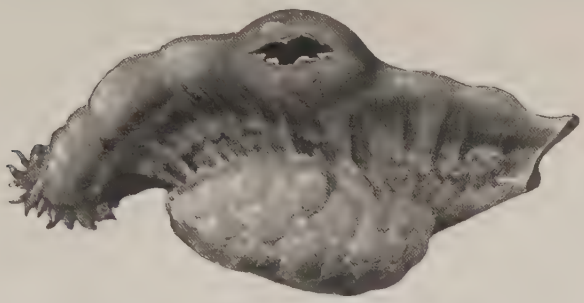


FIG. 169.—Primary Extra-peritoneal Rupture. From an actual Specimen.

expelled into the peritoneal cavity, forming a complete or incomplete tubal abortion (Fig. 172).

For complete tubal abortion to eventuate, it is obvious that the abdominal ostium must remain patent.

In this case intra-peritoneal hæmorrhage, sometimes diffuse, but usually localised on account of its relatively slow rate of flow (pelvic hæmatocele), results.

If the ostium is closed, a hæmato-salpinx is formed, and the blood, unable to escape into the peritoneum, often finds its way into the uterus and appears at the vulva.

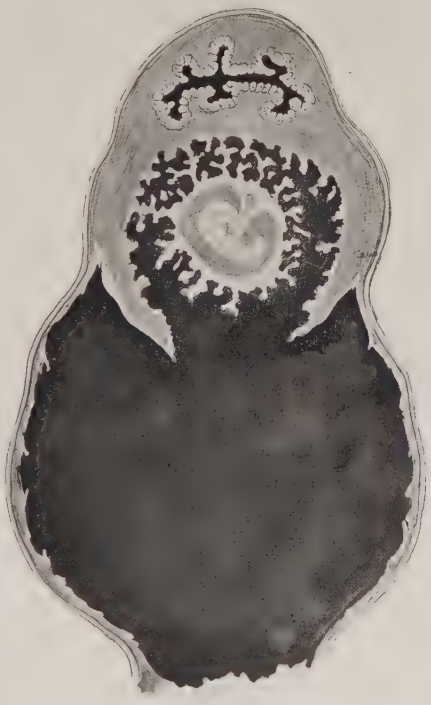


FIG. 170.—Primary Extra-peritoneal Rupture. The effused blood has formed a Hæmatoma in the Broad Ligament.

Formation of a Tubal Mole.

As we have pointed out elsewhere,[1] intra-mural rupture is the primary event in most cases of ruptured tubal gestation. If the blood effused into the gestation sac clots, a mass is formed which constitutes a tubal mole.

[1] *British Journal of Obstetrics and Gynæcology*, 1905.

Exceptionally the process may now stop and the mole remain in the tube wall, probably to be absorbed in course of time; it may be discovered when operating for some other condition.

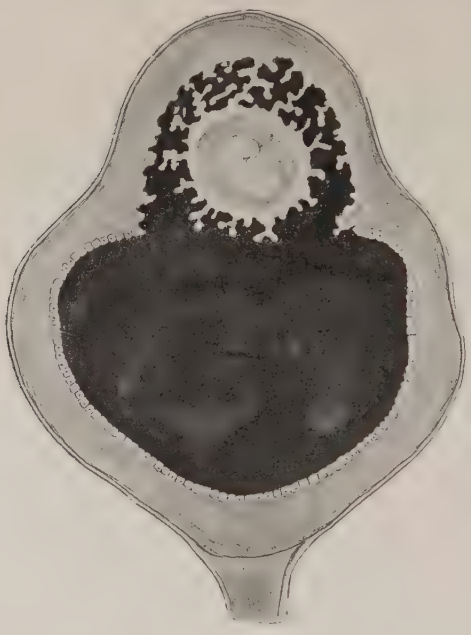


Fig. 171.—Primary Intra-tubal Rupture. The effused blood has distended the Lumen of the Tube.

Much more commonly, however, a further hæmorrhage occurs into the gestation sac, and the tube ruptures in a new direction, *i.e.*, into the peritoneal cavity (Fig. 173), the lumen of the tube (Fig. 174), or in both directions (Fig. 175). In each of these events, the mole will probably be expelled in one of these directions.

Erosion of the Tube.

Erosion was the name given to the process by which an ovum escapes from the tube, and continues to develop external to it. It is in reality a slow rupture, and is due to the trophoblast gradually penetrating the muscular coat without opening up any

Fig. 172.—Incomplete Tubal Abortion. From an actual Specimen.

large vessel. The likelihood of any large vessel being missed is very remote, and tubal erosion is, in consequence, very rare.

Tubal erosion was first described by Taylor, and his description was particularly interesting from the fact that it adequately accounted for most of the cases of abdominal pregnancy which, up to that time, had been considered as primary in origin.

The penetration of the wall is so gentle that the ovum bulges through it, without its amnion being ruptured or its placenta being detached, and continues to develop outside the tube.

Fig. 173.—Intra-mural Rupture with Secondary Intra-peritoneal Rupture. The Blood effused into the Gestation Sac has ruptured into the Peritoneum.

Fig. 174.—Intra-mural Rupture with Secondary Intra-tubal Rupture. The Blood effused into the Gestation Sac has ruptured into the Tube Lumen.

There are two routes by which the ovum may erode out of the tube: one into the peritoneal cavity, and the other into the broad ligament, and following the terminology of the tubal ruptures, we may have a primary intra-peritoneal erosion or a primary extra-peritoneal erosion, according to whether the fœtus, surrounded by its membranes, protrudes into the peritoneal cavity or into the broad ligament.

Primary Intra-peritonal Erosion (Secondary Abdominal Pregnancy).—In this event the fœtus continues to develop in a sac in

the peritoneal cavity either until it dies, or its sac ruptures, or it reaches term (Fig. 176).

Death of the Fœtus.—The fœtus may die any time between erosion and term. If the fœtus dies, it may become mummified, or it may become converted into adipocere or into a lithopædion, or it may suppurate.

Suppuration is usually a sequel to one of the first three events.

Rupture of the Sac.—The sac, which forms round the membranes after the gestation has escaped, and which consists of adhesions, omentum, and intestine, is ruptured by the growth of the fœtus, and with it very often large vessels in the sac. This accident is called *secondary intra-peritoneal rupture*, and results either in diffuse intra-peritoneal hæmorrhage, the child perishing, or where the sac ruptures without any vessels being opened, a live fœtus escaping among the intestines.

Fig. 175.—Intra-mural Rupture with Secondary Intra-peritoneal and Intra-tubal Rupture.

Development to Term.—Continued development to term is rare. At term spurious labour comes on, and then one of two things happens: either the sac ruptures, or the child dies and becomes sequestered. In the first event the child escapes amongst the intestines, with or without diffuse intra-peritoneal hæmorrhage. In the second the results are similar to those mentioned under Death of the Fœtus.

Primary Extra-peritoneal Erosion (Broad Ligament Pregnancy).—In this case the fœtus surrounded by its membranes has protruded into the broad ligament, and continues to develop there until it dies, or its sac ruptures, or its sac erodes, or it reaches term.

Death of the Fœtus.—The fœtus may die any time between the erosion and term. If it dies, the results are similar to those mentioned when describing primary intra-peritoneal erosion.

Rupture of the Sac.—The sac in this case is partly formed by the peritoneal coverings of the broad ligament.

Severe hæmorrhage may occur, the child either perishing or escaping into the peritoneal cavity.

Erosion of the Sac.—In some reported cases the gestation has apparently eroded through the broad ligament into the peritoneal cavity. Pregnancy has therefore continued, no vessels of importance having been torn across. This event, therefore, corresponds in its results to the primary erosion noted by Taylor

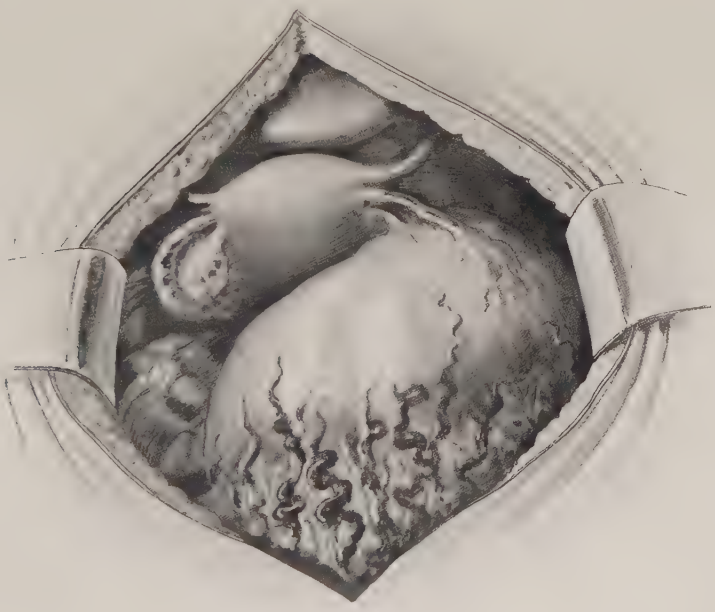


FIG. 176.—Secondary Abdominal Pregnancy. Tubo-peritoneal Sac.

already dealt with. We may, therefore, call it a *secondary intra-peritoneal erosion.*

The child continues to develop in a sac partly formed by the broad ligament and partly by peritoneal adhesions.

To all intents and purposes, therefore, the local conditions are now the same as a primary intra-peritoneal erosion, only the age of the child is of somewhat later date.

For the further history of such a condition, therefore, the reader is referred to the paragraphs on primary intra-peritoneal erosion.

Development to Term.—Cases have been reported in which the child has continued to develop till term between the layers of the broad ligament. These cases are particularly formidable, because the whole fœtal sac may be placentous.

The results are the same as development to term after intra-peritoneal erosion, for details of which the reader is referred to p. 537.

SYMPTOMS AND SIGNS.

With regard to the symptoms and signs of tubal gestation, we may best consider them in relation to the various events in the natural history of the condition, namely:

Before rupture.
At rupture.
After erosion.
At term.
After term.

Before Rupture.

Tubal pregnancy before rupture of the gestation sac does not give rise to any symptoms other than those of early pregnancy. It follows, therefore, that the discovery of an intact gestation in the wall of the tube would in most cases be an accidental stroke of good fortune. We are ourselves only aware of one recorded instance, the specimen from which was investigated by T. G. Stevens.

At Rupture.

The symptoms and signs will vary according to the nature of the rupture and its extent.

The rupture usually takes place about the sixth week; it has been noted as early as ten days after fertilisation and as late as three months.

Intra-mural Rupture.—In these cases before the rupture has become compound, that is, before the blood effused into the gestation sac has burst into the peritoneal cavity, broad ligament or tube, as the case may be, the symptoms are slight and the signs are apt to escape detection. The indications pointing to pregnancy depend on the duration of the gestation. They tend to be less marked than in intra-uterine fœtation. The patient usually gives a history of amenorrhœa, and perhaps of morning sickness, and tenderness and swelling of the breasts, and certainly of a pain in the lower abdomen on one or other side, otherwise she would not have sought advice. This pain came on suddenly and without cause.

The cervix may be softened and bluish, though this is not often well marked. The uterus will be enlarged, though the size does not correspond to the duration of the amenorrhœa. The breasts may be firm and a secretion may be expressible.

To one or other side of the uterus will be felt a tender swelling involving the tube.

Primary Intra-peritoneal Rupture.—These cases may be divided into two classes : Acute fulminant cases and semi-acute cases.

Acute Fulminant Cases.—Without warning the patient may be seized with acute pain and faintness, and in an hour or less may present all the symptoms of acute intra-peritoneal hæmorrhage. In addition she may have the signs and symptoms of pregnancy already detailed.

The signs of acute intra-peritoneal hæmorrhage are present. A local vaginal examination in these cases commonly reveals no tumour, since liquid blood cannot be felt and the mass formed by the gestation is too small. The patient is intensely blanched and may be only semi-conscious.

There is usually severe pain on examination.

Semi-acute Cases.—The symptoms and signs correspond more or less with those of intra-tubal rupture (see below).

Primary Extra-peritoneal Rupture.—The symptoms of rupture into the broad ligament correspond with those of intra-tubal rupture, but those relating to the bleeding may not be so severe, since its amount is controlled somewhat by the boundaries of the broad ligament.

The signs of hæmorrhage according to the amount lost will be present. In addition a tender swelling will be found in one or other broad ligament (pelvic hæmatoma), pushing the uterus over to the opposite side.

Intra-tubal Rupture.—The patient, if she is well enough, may give a history of the symptoms of early pregnancy, and may state that during the last few days there has been an irregular vaginal hæmorrhage and that a "substance" has been passed.

The rupture causes an attack of pain of varying intensity, at times so bad as to be unbearable and to cause the patient to faint. This attack of pain may be repeated several times, and sooner or later as a rule a discharge of blood from the vagina appears.

Such repeated attacks of pain, associated with symptoms of internal bleeding, are very suggestive of tubal abortion.

The signs of hæmorrhage are more or less marked according to the amount of internal bleeding.

A swelling can be felt in one or other tube which is very tender on palpation, and there may also be a tender swelling behind the uterus (pelvic hæmatocele). If a "substance" has been passed it will be found on examination to consist of the decidual cast of the uterus, either whole or in part (Fig. 177).

After Erosion.

Erosion of the tube as a rule produces no symptoms. Occasionally a patient presenting herself with an extra-uterine gestation in the later months may give a history of a sharp attack of abdominal pain, which passed off. Where such pain was associated with loss of blood from the vagina or the passage of a cast she may have believed that she miscarried.

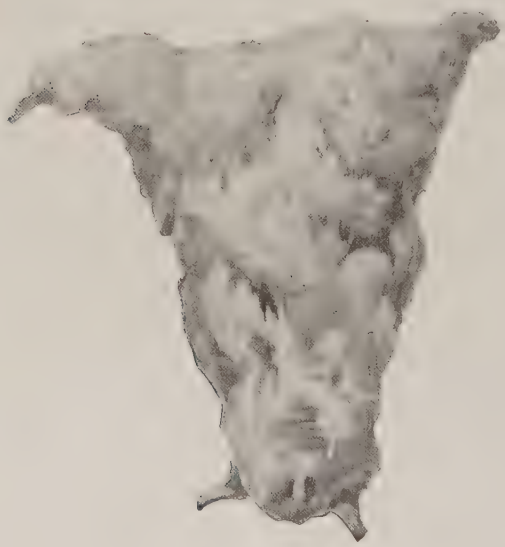


Fig. 177.—Decidual Cast.

After erosion the practitioner is likely to be consulted under three conditions:

When the child is alive.

When the child is dead.

On rupture of the sac.

When the Child is Alive.—The usual history of these rare cases is this:

The patient believes herself to be pregnant, but seeks advice because of pain, or because, and that more rarely, the child is felt to be "to one side" and "more superficial" than usual.

According to the length of its duration the signs of pregnancy will be present, more or less marked, including perhaps the signs of fœtal life. The uterus, however, is not as large as it should be, and the child is felt to be much nearer the abdominal parietes than usual.

When the Child is Dead.—If the child dies, the condition may remain undiscovered unless inflammation supervenes, or a routine examination for some other condition may reveal the tumour. The history may guide one to a diagnosis; but, on the other hand, it has often happened that only on operation has the real cause been discovered.

Some patients are so tolerant that at times the first intimation the practitioner has is the formation of an abscess and the discharge of small bones with the pus.

On Rupture of the Sac.—The symptoms and signs of rupture of a tubo-peritoneal or tubo-ligamentary sac will depend upon whether any vessels have been torn when this complication ensued.

If the placental attachment has been disturbed, the hæmorrhage may be so furious that the patient may die almost immediately.

Short of this, the symptoms and signs will be those of internal hæmorrhage, pain, and the presence of the fœtus apart from the uterus.

If the amnion has been ruptured and the fœtus has escaped without tearing any blood vessels, no symptoms of hæmorrhage will be present at the time, but there will be more or less severe shock. In a case under the care of our colleague Sir John Bland-Sutton, the presence of a living child loose amongst the intestines produced paroxyms of great distress due to the movements of the child.

At Term.

Spurious labour comes on with regular pains and a "show," due to the separation of the decidua.

An examination discloses the fact that there is no bag of membranes, that the cervix is not dilating, and eventually that the child is not in the uterus.

After Term.

It is difficult to conceive any woman so ignorant or so careless that having gone to full term and passed through a spurious labour, she would be content to let it rest at that. And yet such cases have been recorded, and the sequestered gestation has been removed by operation or discovered *post-mortem* many years afterwards.

The symptoms and signs consist of the presence of an abdominal tumour, associated in many cases with those of inflammation in its neighbourhood.

The history might help to a diagnosis, or the condition may only be discovered on operative exploration.

If suppuration takes place and the abscess is not surgically opened, it eventually finds an exit through the abdominal wall, intestine, vagina, bladder, or rectum, according to whether the position of the gestation is intra-peritoneal or extra-peritoneal.

DIAGNOSIS.

At Rupture of the Tube.

The salient points of a ruptured tubal gestation in the early months are the symptoms of pain, internal bleeding, vaginal

hæmorrhage and a tender swelling in Douglas's pouch. In a typical case all these are present; exceptionally some may be absent.

The diagnosis will therefore be considered under these headings.

Pain.—The pain of tubal rupture or abortion is at times so acute that it has often been mistaken for some other condition associated with great abdominal pain, as, for instance, a twisted ovarian cyst, acute appendicitis, ruptured pyosalpinx or ovarian abscess, renal colic, biliary colic, or perforation of an abdominal viscus.

Hæmorrhage.—Symptoms and signs of internal hæmorrhage may be due to bleeding into the intestinal canal from a typhoid, tubercular, duodenal, or gastric ulcer. In these cases the bleeding is into the stomach or bowel, and some blood may be vomited or passed per rectum.

Internal hæmorrhage may also be due to a ruptured ovarian cyst or follicle, or to rupture of an ovarian pregnancy. It is then intra-peritoneal.

In regard to a differential diagnosis of these conditions, it may be pointed out that it is only in the last three that symptoms and signs of intra-peritoneal hæmorrhage are present. We would impress upon the reader, however, that if a woman of childbearing age has a sudden attack of severe abdominal pain with symptoms of internal bleeding, accompanied by a vaginal hæmorrhage, the condition in all probability is due to a ruptured tubal gestation.

If the symptoms of internal hæmorrhage are not severe, the case may be confounded with one of incomplete uterine abortion from the fact that the patient has had some of the signs and symptoms of pregnancy, has developed an irregular discharge of blood from the vagina, and may have passed a substance thought to be the ovum, but which in reality is a decidual cast.

We have seen several cases of this mistaken diagnosis, in some of which curetting had been carried out.

The commoner types of abdominal catastrophe from which tubal gestation has to be distinguished are associated with the symptoms and signs of shock and not of internal hæmorrhage, see p. 249. In many of them also the primary site of the pain is the upper abdomen.

Tender Swelling in Douglas's Pouch.—The tender swelling is the distended tube, with often a collection of blood free in the pouch of Douglas. It is most important to recollect, however, that in the fulminant cases no such swelling is present, and, further, that in any case it only develops after the lapse of some little time. A tender swelling in Douglas's pouch may also be due to salpingitis, tubo-ovarian abscess, appendicitis, an inflamed ovarian or uterine tumour,

an ovarian pregnancy, a ruptured ovarian blood cyst, or a retroverted gravid uterus, more particularly if this is associated with a threatened or inevitable miscarriage.

In making the diagnosis it is to be remembered that in a twisted or inflamed cyst or tumour a defined mass is present from the first.

In the case of inflammatory disease of the tube, ovary or appendix, the swelling develops more gradually, and in this respect resembles tubal gestation, but fever is present from the first, whereas in the latter it only develops after the lapse of some time. Neither in the case of a tumour nor in inflammatory conditions are the symptoms and signs of pregnancy likely to be present.

The distinction of the mass formed by tubal gestation from the swelling produced by a retroverted gravid uterus is much more likely to be overlooked, since in both cases the symptoms and signs of pregnancy are present.

The difficulty becomes more marked if the hæmatocele causes retention of urine, a leading sign in retroversion of the gravid uterus when it is incarcerated, see p. 168.

A careful consideration of the history, together with a local examination disclosing the uterus in its proper position and an extra-uterine swelling behind it, should prevent such a mistake being made.

Another common error is for the practitioner to construe the swelling formed by the tubal gestation as due to a pelvic peritonitis secondary to a septic intra-uterine abortion, owing to the fact that the patient states that she has miscarried because a uterine cast has been expelled, and that by the time the practitioner is called in fever due to infection of the hæmatocele is present.

After Erosion but before Term.

In the absence of the violent symptoms which rupture of a tubo-ligamentary or tubo-peritoneal sac produces there may be difficulty in diagnosing such a case from a uterine pregnancy.

In some cases it may be possible to feel the uterus apart from the tumour formed by the child.

A certain diagnosis may only be possible on passing the sound into the uterus. It need hardly be said that this should not be done until it is decided to interfere, and then only just before the operation is to be performed and after consultation with another medical man.

Oligamnios may awaken suspicion of extra-uterine gestation because of the abdominal ease with which the parts of the child can be made out, see p. 204.

At Term.

Spurious labour should be suspected from the absence of a presenting bag of membranes or any part of a fœtus. If there is doubt a finger should be passed through the cervix, for the diagnosis is at once evident when the uterus is found to be empty; but that it is not so easy as at first might be thought is evidenced by a case we have knowledge of, where for many hours the patient was treated for an ordinary labour of a slow type by well-qualified attendants. On a more careful examination being made to discover the cause of the delay, one of the observers noted that the child was peculiarly superficial; in the remark of the attendant, "it felt as if I could shake hands with it." This led to dilatation of the cervix being performed and the discovery that the uterus was empty.

If the sac ruptured, the operation necessary to save the patient would disclose the nature of the case.

After Term.

The diagnosis of a sequestered extra-uterine gestation is made on a history pointing to that event conjoined with the presence of an abdominal tumour. The passage of fœtal bones through a sinus sometimes discloses the nature of the condition.

TREATMENT.

The treatment of tubal gestation depends upon whether the patient is seen first before rupture has taken place, when rupture has occurred, between erosion and term, or after term.

Before Rupture.

As there are no symptoms to draw attention to a tubal gestation before rupture, the condition is only likely to be suspected when a vaginal examination of an early pregnant woman accidentally discloses a swelling in one or other tube.

In the event of such a finding an operation should be advised, and if on opening the abdomen the diagnosis is confirmed, the affected Fallopian tube should be removed, thus anticipating the rupture.

At Rupture.

In our opinion, all tubal gestation diagnosed in the first five months should be operated upon. Those authorities who are not in agreement with such treatment base their objections on the assumption that if the fœtus has perished, the blood already effused will be absorbed without further trouble.

It is, however, impossible to certainly diagnose that the fœtus has

perished, and even if it be dead, the trophoblast in the wall of the gestation sac may continue to grow and, invading the tube wall, lead to a further hæmorrhage.

The second contention that the blood will be absorbed without further trouble is equally untenable, for, in the first place, after the patient has been many weeks in bed, the hæmatocele may suppurate; or, secondly, during the process of absorption, the abdominal ostium of the healthy tube may be permanently occluded by adhesions thus formed. These may also retrovert and fix the uterus or cause intestinal obstruction. The opposite tube is usually found distended and occluded in operations for hæmatocele, whereas in the fulminant cases it is almost invariably found to be healthy.

The most recent statistics also prove that the mortality as well as the morbidity is higher when these cases are not treated by immediate operation.

Intra-mural Rupture.—It is especially important, having recognised such a case, to operate upon it at once before a compound rupture, and, therefore, perhaps serious loss of blood, has had time to occur.

Primary Intra-peritoneal Rupture.—*Acute Fulminant Cases.*—There is no class of case in which prompt and determined surgical measures are followed by more success than that of acute intra-peritoneal rupture.

The abdomen having been opened, the operator should as quickly as possible pass his fingers down to the uterus, and from thence to the affected Fallopian tube, which he grasps, pulls up and clamps. The bleeding being thus stopped, the tube is examined and removed, unless the rent is a small one, the tube in good condition and the gestation entirely evacuated from it, when the rent might be sutured. The ovary should be conserved if possible.

The opposite tube is examined and removed if diseased; it is generally healthy. The effused blood in the pelvis is cleared out, and swabs are passed up into the loin pouches to remove any accumulation there.

If the patient's condition is very bad, not much time must be spent in trying to clear out all the blood, and an assistant should meantime proceed to perform saline infusion into the median basilic or median cephalic vein.

Semi-acute Cases.—In these cases the omentum will be found adherent to the fundus of the uterus and to the appendage on the diseased side.

The omentum, which is often discoloured, must be separated, and the clot forming the hæmatocele scooped out, when the ruptured

Fallopian tube will be found buried in the latter at the bottom of the pelvis.

The tube and ovary are pulled up and examined. The tube alone should be removed unless the ovary is hopelessly disorganised.

The opposite tube will frequently be found to be in a condition of hydro-salpinx or hæmato-salpinx, when it should be opened, emptied, and salpingostomy carried out.

If there is troublesome oozing from the bed of the separated tube, hot swabs must be applied to arrest it. If the temperature of the patient has been raised beforehand, suggesting septic infection, a drainage tube should be inserted, otherwise one is not necessary.

Primary Extra-peritoneal Rupture.—The treatment of rupture of the gestation sac into the broad ligament with a hæmatoma thereof is conducted on similar lines to that described for the semi-acute cases, but in addition the sac left after the hæmatoma has been evacuated has to be dealt with.

If the effused blood is limited to the mesosalpinx it is generally possible to remove the sac *en masse* with the tube.

If the effused blood has invaded the broad ligament proper, raising the peritoneum off the side wall of the pelvis and iliac fossa, and (on the left side) finding its way into the mesentery of the colon in addition, the affected Fallopian tube should be removed, the blood evacuated from the sac, and the opening of the sac stitched to the parietal wound, after which the sac should be packed with gauze or drained by a tube and allowed to granulate up.

If there is difficulty in controlling the bleeding from the sac wall, it may be necessary to remove the uterus and upper part of the broad ligament, and the anterior peritoneal flap thus obtained can be used to cover over the raw surface forming the base of the sac.

Intra-tubal Rupture.—The treatment for tubal abortion is the same as that already described for the semi-acute cases of extra-tubal rupture.

After Erosion.

As with the advance of pregnancy the placental surface becomes increasingly large, and the vascularity of the parts greater, these cases present features peculiar to themselves.

As we have mentioned, after erosion the gestation sometimes proceeds to term without further trouble, but at other times operative treatment will be demanded for some acute symptoms that have arisen.

In these cases the treatment depends mostly on whether the child is alive or dead.

When the Child is Alive.—The position of the placenta requires serious consideration.

If the sac is tubo-peritoneal, the placenta is most commonly adherent to the back and fundus of the uterus, the affected tube, the back of the broad ligament, and the omentum, positions in which it is possible to control the vessels before attempting its removal.

In other cases, however, the placenta may be adherent to the intestine or the iliac fossa, in which event it is not possible to follow this procedure.

If the sac is tubo-ligamentary, *i.e.*, between the layers of the broad ligament, the case is then more serious still, for in this situation nearly all the chorion is placentous, and it may be impossible to remove the child without incising it, while the vessels cannot be controlled beforehand.

The treatment will depend upon the position of the sac, and whether the patient first comes under observation before the sixth month, or from the sixth month to term.

Before the Sixth Month.—*Gestation Sac Tubo-peritoneal.*—If the gestation sac is intra-peritoneal, its complete removal should be attempted.

Before proceeding to this, as many tributary vessels as possible in the omentum, the ovarico-pelvic ligament, and, if necessary, on the opposite side of the uterus should be ligated.

The gestation sac should now be opened, the fœtus removed, and the placenta rapidly peeled off.

Gestation Sac Tubo-ligamentary.—If the gestation has not advanced beyond the fourth month, or the sac is so situated that its entire removal appears feasible, it is best to do this.

The bleeding, which will be free, may be somewhat controlled by removing the uterus as well, commencing the hysterectomy on the side opposite the gestation sac and securing the uterine artery on the same side, when the supra-vaginal cervix is cut across, and before the extirpation of the sac.

If, however, the gestation has advanced to the fifth month, or the sac is deeply embedded between the layers of the broad ligament, the sac should be opened, the fœtus removed, and the placenta sequestered by closing the apertures in the broad ligament with sutures. The closed sac must then be fixed to the parietal incision, so that in case it has to be reopened for sepsis or bleeding, the operation will be extra-peritoneal.

The *rationale* of sequestration of the placenta is founded on the

good results obtained by nature in cases of spontaneously sequestered tubal gestation.

It sometimes happens that it is impossible to incise the broad ligament sac without cutting through the placenta.

If the bleeding from the cut edges of the placenta can be controlled with sutures, sequestration may be proceeded with. If the bleeding cannot be thus controlled, the placenta will have to be extirpated.

An alternative to sequestration is marsupialisation, in which the sac is stitched to the abdominal wound and drained. This is, however, a very fatal proceeding, the placenta sloughing, and the patient generally dying of secondary hæmorrhage or acute sepsis.

From the Sixth Month to Term.—If tubal gestation has advanced to or beyond the sixth month without causing urgent symptoms, it has been conclusively shown that it is safest to let the patient alone, in the good hope that the child will die sooner or later, after which its removal is comparatively safe.

If urgent symptoms arise, the surgeon must interfere, and is then confronted with the same difficulties mentioned under the preceding section, only intensified by the increased size of the placenta.

Gestation Sac Tubo-peritoneal.—If the placenta is below the child, the best course is to remove the latter, then close the sac and sequester the placenta.

If the placenta is above the child and delivery cannot be effected without cutting through it, the bleeding resulting may necessitate its removal, but an attempt should first be made to arrest the hæmorrhage with ligatures.

In some of these cases the child can be delivered without interfering with the placenta, which can then be sequestered, or if it is possible to control its blood supply, as is sometimes the case when this is mostly derived from the omental vessels, the placenta may safely be extirpated.

Gestation Sac Tubo-ligamentary.—The treatment is the same as that described under the heading of Before the Sixth Month.

When the Child is Dead.—If the child is dead, the whole gestation can in most cases be removed without serious risk, and this therefore should be done whether the sac is intra- or extra-peritoneal. If the tumour has suppurated, the sac must be drained after evacuation.

At Term.

The patient should be carefully watched. In many of the reported cases the spurious labour has ceased and the child

has subsequently died. In this event the treatment will be as described in the next section. In other instances the sac ruptures during labour, and the resulting hæmorrhage is great. In this event immediate operation is imperative.

This procedure will then be conducted on the lines already laid down in the preceding section.

After Term.

A patient the subject of a sequestered extra-uterine gestation after term will seek advice either because of the tumour or of some septic change taking place in it.

If advice is sought for the tumour only, the child and placenta, being dead, can be removed with comparative safety. It is best to wait till three months have elapsed since the spurious labour, as by this time the placental vessels will be entirely thrombosed.

Where suppuration has occurred in the sac, the patient must, of course, be operated upon. No general rules can be laid down; some of these cases can be easily dealt with, but in others, where fistulous tracks have formed communicating with the intestine and bladder, the operation may be very formidable.

Advanced cases of tubal gestation are rare; no two cases are alike in their anatomical relationship. No single surgeon has had sufficient experience to warrant his generalising. Small wonder, therefore, that the question of the operative treatment is beset with the greatest difficulties. It can only be founded on a careful consideration of the peculiarities of each case.

OVARIAN PREGNANCY.

In ovarian pregnancy, the ovum having become fertilised in the follicle grafts on its wall, and burrowing its way into the ovarian substance proceeds to develop there (Fig. 178).

The gestation sac, *i.e.*, the space the gestation hollows out for itself, is thus entirely surrounded by ovarian tissue, except at the point at which the oösperm passed through the wall of the follicle. The condition is a very rare one.

RESULT.

As the gestation grows the ovary becomes expanded over it, and cases are on record in which the pregnancy actually appears to have reached viability enclosed in a capsule of ovarian tissue.

More commonly, however, the gestation sac ruptures, either directly into the peritoneal cavity or back into the follicle.

In the first event immediate intra-peritoneal hæmorrhage occurs.

In the second, bleeding first takes place into the follicle, which distending eventually ruptures into the peritoneal cavity. The ultimate result in either case is therefore the same, namely, symptoms of acute intra-peritoneal hæmorrhage.

SYMPTOMS AND SIGNS.

The general symptoms and signs are identical with those of intra-peritoneal rupture of a tubal gestation.

DIAGNOSIS.

An exact diagnosis can only be made after opening the abdominal cavity.

Hæmorrhage from the ovary may occur under other conditions,

FIG. 178.—Ovarian Gestation.

namely, in rupture of a follicular blood cyst, and in the rare instances of excessive bleeding after dehiscence of a Graafian follicle.

It therefore follows that the diagnosis of ovarian gestation is only absolute if the presence of gestational elements in the ovary can be unequivocally seen either by the naked eye or on microscopic examination.

TREATMENT.

As in tubal gestation, the abdomen should immediately be opened. The bleeding ovary on being found must be removed, either with or without the corresponding tube as appears advisable.

The effused blood must be mopped out of the peritoneal cavity

as far as the circumstances of the case will permit, and if fever has been present beforehand or much oozing is going on, a drainage tube should be inserted for a day or two.

Recorded cases of advanced ovarian gestation seem to show that the removal is easier than is the case in tubo-peritoneal or tubo-ligamentary pregnancy, see p. 565.

INTERSTITIAL PREGNANCY.

When the fertilised ovum grafts in that portion of the tube that

FIG. 179.—Tubal Gestation. Interstitial Variety.

is situated in the uterine wall, the pregnancy is styled "interstitial."

The gestation sac lies in the musculature of the uterine wall (Fig. 179), and with the growth of the ovum may rupture in one of four directions, namely:

1. Into the peritoneal cavity.
2. Into the lumen of the uterus.
3. Into the lumen of the tube.
4. Between the layers of the broad ligament.

SYMPTOMS.

Intra-peritoneal Rupture.—Intra-peritoneal rupture is the usual termination of interstitial pregnancy, and occurs most commonly about the third month.

The symptoms of the disaster are identical with rupture of a tubal gestation sac, wheresoever located, see p. 556.

The physical signs are more difficult of interpretation than in the case of gestation in the isthmic or ampullary segments of the tube, because the tumour produced is actually part of the uterus, and may be mistaken for the enlargement due to a normally situated pregnancy.

Intra-ligamentous Rupture.—The same remarks apply to the much rarer intra-ligamentous rupture.

Intra-uterine Rupture.—Rupture into the lumen of the uterus would produce symptoms and signs identical with threatened or inevitable abortion of a normally situated pregnancy. It is possible that a certain number of these cases have been unrecognised.

Intra-tubal Rupture.—Rupture into the tube is very unlikely on account of its small calibre in this segment of its course.

DIAGNOSIS.

The statements made on p. 559 apply in the main to interstitial pregnancy.

Until rupture of the gestation sac takes place, the normal symptoms of pregnancy are alone present.

The sudden onset of severe pain and signs of intra-peritoneal hæmorrhage associated with an asymmetrical enlargement of the uterus would warrant a pre-operative diagnosis of ruptured interstitial pregnancy.

As a fact, most recorded cases before operation have been considered as examples of ruptured tubal pregnancy in its more common situations.

An angular pregnancy may be mistaken for interstitial gestation, see p. 571.

TREATMENT.

The abdomen must be immediately opened. An interstitial gestation having been found, one of two courses may be adopted:

First, the involved cornu with the gestation may be excised by an angular incision, the wound in the uterus being subsequently closed by deep mattress sutures to check the hæmorrhage, and a superficial continuous suture to coapt the peritoneal edges.

Secondly, subtotal hysterectomy may be performed.

Of the two procedures, the first as the more conservative is best suited for young women, especially if childless, and we have carried it out successfully. It has the drawback that a good deal more bleeding may occur than if hysterectomy was performed.

The latter operation is the best course to pursue for surgeons unacquainted with the technique of excision of large pieces of the uterus, and it is further indicated where rapidity of action and minimal loss of blood is essential, and where, by reason of age and parity, the potentiality for further childbearing is not so necessary to be preserved.

ANGULAR PREGNANCY.

Angular pregnancy implies the grafting of the ovum in one of the cornua of the uterus just within the spot where the lumen of the tube joins that of the uterus. But little is known of this event nor the frequency with which it occurs.

RESULT.

The gestation, as it grows, produces an asymmetrical enlargement of the uterus, which may awaken suspicion that the pregnancy is in the tube and not in the uterus.

It is believed that there is a tendency to abortion; but if the life of the gestation continues, the ovum gradually occupies the whole available space in the uterine cavity, and the fact that the original site of grafting was in the cornu becomes unrecognisable.

DIAGNOSIS.

The chief interest of angular pregnancy is that the asymmetrical enlargement of the uterus may be attributed to interstitial gestation.

PREGNANCY IN A DOUBLE UTERUS.

There are several varieties of double uteri, but from an obstetrical point of view they may be divided into two classes: one in which both horns are properly developed, and the other in which only one horn is developed.

Bicornuate Uterus with both Horns Developed.

In whichever horn the fertilised ovum is grafted, the other horn enlarges, becomes softer, and its endometrium undergoes a decidual reaction.

One horn may be pregnant, or both horns may be pregnant. The proportion of twins with bicornuate uteri is distinctly greater than

in normal cases, for whereas with a single uterus the proportion is 1 in 89, with double uteri it is 1 in 12.

RESULTS.

If an ovum is grafted in each horn, pregnancy may go to term and the children be born normally, or one horn may expel its contents without disturbing that of the other, so that, for instance, a woman may have a five-months abortion from one side and a full-term child from the other.

Again, whilst gestation may occur simultaneously in both horns it may also occur at different periods, one horn becoming pregnant say three months or so after the other. This condition is known as superfœtation.

Miscarriage or premature labour is very common, the uterine wall not being sufficiently well developed to accommodate itself to the growing ovum. Uterine inertia may be marked, the non-pregnant horn interfering with the contractions.

Labour is most frequently normal, but many complications have arisen. Obstruction may result either by the non-pregnant horn becoming displaced in front of the presenting part; by the delivered horn, when both are pregnant, acting in the same way; or by the uterine tissue of the non-pregnant horn at the level of the supra-vaginal cervix forming a thick buttress.

Under all these circumstances Cæsarean section will be necessary and has been successfully performed, as it also has been where the head of a six-months child had become detached in one horn, and, owing to the other horn getting in the way, delivery of the head by the vagina was impossible.

The presentation of the fœtus may be abnormal, a transverse position being commoner owing to the oblique position of the uterus.

The uterus may rupture spontaneously, or be ruptured during the efforts of extracting the child.

The septum between the uteri may give way, and the child be expelled through the cervix of the unimpregnated horn.

Post-partum hæmorrhage may result from the previous inertia of the uterus or from a retained placenta, it being very difficult at times to get this organ expelled. Puerperal morbidity is higher, the contributory factors being post-partum hæmorrhage; retention of the decidua in the unimpregnated horn; retention of the placenta, and the additional internal manipulations that are at times necessary. Puerperal pyometra of one horn has been recorded.

In the two cases we have had under our care, one went to full term and the child was born without any trouble; the other aborted at about four months, but the placenta was retained and gave rise to a very serious hæmorrhage.

DIAGNOSIS.

If there is no vaginal septum and only one cervix, a double uterus is likely to escape detection, or the unimpregnated horn may be taken from a fibroid.

If the empty horn gets in the way of and below the presenting part, it forms a soft mass in the pelvis, prevents the head of the child from engaging, and has been mistaken for a placenta prævia or a fibroid.

TREATMENT.

Labour should be conducted on the usual lines. If, however, both horns are pregnant and the membranes of one remain unbroken after the birth of the first child, they should not be interfered with. It may be a case of superfœtation.

If one horn gets in the way of the other sufficiently to cause serious obstruction, Cæsarean section is indicated.

Bicornuate Uterus with one Horn Undeveloped.

If the horn of the uterus in which the ovum grafts be undeveloped, a condition analogous to tubal pregnancy arises. The undeveloped horn in the large majority of cases has no appreciable communication with the cavity of the developed horn, the pregnancy occurring by migration of the spermatozoa or ovum from the appendage on the opposite side (Fig. 180).

RESULT.

Cornual pregnancy, as it is styled, runs the same course as tubal pregnancy, the only difference being that rupture occurs, as a rule, later in the case of a horn than in the case of a tube.

DIAGNOSIS.

Cornual and extra-uterine gestation are indistinguishable, and the true condition is only to be made out after the abdomen is opened, when it will be noted that in the former the round ligament runs into and blends with the tumour on its outer side.

TREATMENT.

The treatment follows the lines of tubal pregnancy as set out on p. 562. Pregnancy has occurred in the developed horn subsequent to the amputation of the rudimentary horn.

Pregnancy in an Undersized Uterus.

The uterus may be smaller than normal either from maldevelopment or from art, and in either case such a uterus may become pregnant.

Infantile Uterus.—Pregnancy in an infantile uterus must be a very rare event, since most of the patients thus afflicted suffer from lack of sexual development in other ways.

Further, a reference to the literature at our disposal has failed to disclose a single case, except that Edgar, in his "Practice of

FIG. 180.—Pregnancy in an undeveloped Horn.

Obstetrics," remarks that Hirst has reported two cases, although he does not give any reference.

One would expect in such an eventuality that the uterus would prematurely empty itself, and this in fact is said to have happened in Hirst's cases. One would also have to consider the liability of the uterus to rupture, and the advisability therefore of inducing an abortion to anticipate such a dangerous complication.

Such a problem did indeed present itself to one of us. It was that of a patient whom a highly-qualified and well-known obstetrician had examined under an anæsthetic with a view of ascertaining whether there was any obvious cause for her sterility. A careful and repeated examination of the uterus showed that its

cavity measured $1\frac{1}{2}$ inches only, from the external os to the fundus. The patient subsequently became pregnant, and after a careful consideration of all the facts, and of the results that had been obtained after utriculoplasty, it was decided to let the pregnancy continue.

Utriculoplasty.—This is an operation devised by Howard Kelly to lessen menorrhagia, when other less drastic measures have failed. It consists in removing a wedge-shape portion of the body of the uterus and uniting the remainder with mattress sutures, thus reducing the size of the uterine cavity. We have performed this operation on ten occasions with uneven results—in some patients relief was obtained, in others the menorrhagia returned and a hysterectomy subsequently had to be performed. Only one patient has subsequently conceived, and that on two occasions. The pregnancy was normal each time—labour came on spontaneously at $7\frac{1}{2}$ months with the first pregnancy and by induction at $7\frac{1}{2}$ months with the second pregnancy. Both labours were normal except for a degree of inertia. The first child was reared.

In connection with the chance of pregnancy occurring in the uterus after utriculoplasty and the danger of rupture should it do so, it is interesting to note a paper by Strassman[1] on the treatment of uterus septus, uterus bicornis, and uterus duplex. He reports five cases of his own and several of other operators, and among them are two in which, after the inner halves of a double uterus had been amputated and the outer halves joined so as to form one uterus, the patients became pregnant. In one case (Strassman's) the patient gave birth to a healthy child without any complications a year later; in the other (Pappel's) the patient became pregnant soon after the operation and miscarried.

Complete Duplication of the Genital Organs.

A unique case has been reported by Gemmell and Patterson in which a woman with complete duplication of the genital organs (double valva, vagina and uterus) successively conceived and gave birth to a child from each genital canal.

[1] *Berlin Klin. Woch.*, September, 1912, p. 1750.

CHAPTER XXIX.

Anæsthesia and Analgesia during Labour.

Anæsthesia during Labour.

Obstetric practice is a branch of surgery. As such none of the operations with which it is concerned can be properly performed without a general anæsthetic.

Unfortunately in the past the obstetric art has been regarded as a department of medicine, and the necessity for conducting labour under the postulates of modern surgery has not been sufficiently insisted on. As a result, even to-day many practitioners are quite willing to apply forceps, perform version and so forth without an anæsthetic.

Operations thus performed cannot be carried out satisfactorily as regards manipulation, or the due observance of the tenets of aseptic and antiseptic surgery.

The delay in the adoption of the principle that all the operative procedures connected with childbirth are simply a special variety of surgery has had this effect, that the public do not regard as necessary, and are chary of paying for, those conditions, accessories, and auxiliaries which in other departments of surgery they appreciate are essential for the success of an operation.

Thus it comes about that while in some cases the performance of an obstetric operation without an anæsthetic is forced upon the practitioner because no anæsthetist is available, in a far larger number this unsurgical proceeding is embarked upon because the medical man hesitates to demand from the ill-educated, and, in this particular, parsimonious laity, that assistance which he would as a matter of course ask for if called upon to perform an operation, however slight, pertaining to any other department of surgery. We are strongly of opinion that the public require educating in this matter.

The practice of the obstetrician himself anæsthetising the patient is a bad compromise. It is impossible for him both to properly render the patient insensible and to perform the operation with maintenance of surgical asepsis and freedom from hurry in his manipulations, while if he hands the anæsthetic over to the nurse he deprives himself of his assistant.

These remarks do not apply of course to chloroform administered as an analgesic (see next section).

For operative purposes a full surgical anæsthesia is requisite. Partial insensibility is worse than useless, for it takes away the patient's self-control and renders her unmanageable.

It has been objected that atony of the uterus is liable to be caused thereby. This is not the case unless the anæsthesia has been pushed beyond the ordinary degree, perfect retraction of the uterine muscle taking place under full anæsthesia, as witness in Cæsarean section.

If for any reason atony of the uterus is expected, hypodermic injection of ergotin or pituitrin may be used as a preventive, but the surgeon should not handicap necessary manipulation by stopping the anæsthetic; indeed, it may be remarked that as regards post-partum hæmorrhage, the uterus is much easier to control in a person who is anæsthetised than in one who is not.

Anæsthesia induced in the second stage should be prolonged into the third stage if there is a perineal laceration that requires suture, and if a manual removal of the placenta or irrigation of the uterus is indicated.

Perineal sutures can be introduced immediately after the birth of the child and left untied until the placenta is delivered. If this is done the anæsthetic need not be prolonged. The method, however, is only good where the laceration is slight and the number of sutures required small.

The advisability of manually removing the placenta, exploring the uterus and irrigating its interior after all operations that have necessitated the introduction of anything into its interior has been discussed on p. 481.

If such a course is decided on, anæsthesia should be maintained to allow of this treatment being carried out painlessly and efficiently.

The Anæsthetic.

Chloroform Anæsthesia is the best for general use; the ideal manner in which chloroform is taken by women in labour needs no insisting upon. It relaxes the uterus better than ether, and at the same time does not encourage hæmorrhage unless administered over a long period. Its use is contraindicated in any toxæmic condition of pregnancy.

Ether, as it is a stimulant, is indicated if the patient is in a serious condition, as for instance after labour associated with shock or hæmorrhage.

Spinal Anæsthesia.—In the anæsthetic state induced by myelitis, or destruction of the cord in the lumbo-sacral region, the uterine contractions are diminished in force but not arrested, and the labour is painless, see p. 102. The effect of anæsthesia induced by intra-thecal injection is similar.

We have employed spinal anæsthesia in a case of terminal valvular disease of the heart in which immediate delivery by vaginal Cæsarean section was indicated. The uterus retracted well.

Spinal anæsthesia is also well suited to cases of advanced tuberculosis of the lungs, bronchitis or pneumonia in whom artificial delivery is urgently needed.

The principal difficulty with all such cases is the inability of the patient to lie down, so that the distribution of the anæsthetic solution tends to be restricted.

Spinal anæsthesia is a method not devoid of danger, and has the drawback that the period of anæsthesia varies considerably in different individuals.

Infusion Anæsthesia.—We have no experience of this method of anæsthesia applied to labour. It would appear best suited to cases of lung disease in whom inhalation anæsthesia was contra-indicated and spinal injection undesirable or objected to.

Analgesia During Labour.

Chloroform Analgesia.—Abolition of pain during labour is often desirable on purely obstetric grounds quite apart from humane considerations.

Many patients insist on the administration of an anæsthetic, and the higher their social position the more chloroform do they demand. No doubt the ideal would be for a woman to lose consciousness at the beginning of the second stage, and only to wake again after the placenta was delivered and the uterus well retracted.

The drawback to complete anæsthesia is that it necessitates artificial delivery in cases in which had the patient been conscious she would have delivered herself.

Partial anæsthesia is therefore preferably employed in a normal case during the height of the second stage, the chloroform being lightly administered by the practitioner or inhaled by the patient herself.

Such partial unconsciousness alleviates the distress without materially affecting the expulsive efforts.

For patients very intolerant of pain or in whom much suffering is undesirable, full surgical anæsthesia should be employed with its coroliary—artificial delivery conducted on surgical principles.

No operation should be undertaken under partial anæsthesia, for

a half-conscious patient is much less manageable than one in full possession of her senses.

Chloroform analgesia is sometimes useful in the first stage of labour, namely, in those cases where a rigid and hypersensitive cervix is associated with colicky ineffective uterine contraction, see p. 292.

Morphine Scopolamine Analgesia.—This method of alleviating the pains of labour has been extensively tried of recent years. Halliday Croom amongst others has reported successful results.

The dose is $\frac{1}{100}$ gr. of scopolamine with $\frac{1}{6}$ gr. of morphine.

The painfulness of the contractions is markedly diminished, and the patient often sleeps between the pains. Usually one injection only is required; but if a second be necessary, the scopolamine alone should be given.

In general it may be said to be best suited for the second stage, but it is specially indicated in cases of painful rigid cervix in the first stage with reflex inhibition of the uterine contraction, see p. 289.

The drugs appear to produce amnesia, abolishing remembrance of the pain suffered, and the uterine retractility does not appear to be adversely influenced.

We agree with Croom in thinking that this method is best suited to patients of nervous temperament to whom the anguish of labour is insupportable.

The use of the drugs does not contra-indicate subsequent resort to chloroform, but forms an excellent prelude to it.

The drawback of this method is that the child is often born in a drowsy, semi-comatose condition, which, however, appears to be practically always recovered from.

DELAYED CHLOROFORM POISONING.

The administration of chloroform in large doses has been shown to produce degeneration of the hepatic parenchyma.

It is, however, a rare event for this degeneration to proceed to extremes in an individual previously healthy.

In nearly all cases of delayed chloroform poisoning a second factor is present, namely, a septic intoxication proceeding from the focus of disease that necessitates the operation. Thus it most often follows chloroform administration for such acute conditions as appendicitis, cholecystitis, and so forth, for it has also been shown that such states quite apart from any operation induce degeneration of the hepatic cells.

The two effects superposed may lead to such changes in the liver that its function breaks down.

Our knowledge of delayed chloroform poisoning is of comparatively recent date and much remains to be discovered. The condition has been more particularly studied in children, in whom it is much more commonly seen than in adults.

SYMPTOMS.

In adults two main types are distinguishable, the hepatic and gastric.

The hepatic type is characterised by jaundice and retching or vomiting. The jaundice deepens and the patient becomes drowsy and finally comatose, resembling in this respect a person the subject of diabetic coma. The urine presents marked changes, acetone and diacetic acid being present in large quantities, while the proportion of ammoniacal nitrogen is greatly increased, see p. 31.

The gastric type is characterised by persistent and uncontrollable vomiting without jaundice. The pulse becomes fast, the tongue dry and brown, and the patient sinks rapidly. In the two cases of this type with which we are personally acquainted a peculiar mental state was present, closely simulating cataleptic hysteria.

As will be apparent from what has gone before, delayed chloroform poisoning is extremely rare after labour in a normal person; indeed in no class of patient is chloroform so well borne.

It is most likely to follow operative procedures for septic miscarriage or puerperal infection.

DIAGNOSIS.

The disaster is so rare that the symptoms are apt to be misinterpreted. In particular the practitioner should not be led into error by the peculiar hysteroid state to which we have drawn attention.

Examination of the urine for products of hepatic breakdown is imperative. Acetone and diacetic acid in certain quantities appear in the urine after all chloroform administrations, but their presence combined with the symptoms described is grave. Of still more importance in determining the functional activity of the liver is an estimation of the ammonia co-efficient, see p. 31.

Delayed chloroform poisoning bears a very interesting relation to three other conditions of toxic degeneration of the liver, namely, toxic vomiting of pregnancy, acute yellow atrophy of the liver, and phosphorus poisoning.

TREATMENT.

Chloroform should not be administered in acute toxic states.

Ether, though it acts on the liver in a similar way, is much less injurious and should be chosen instead, or some form of analgesia may be employed, see p. 579.

Bicarbonate of sodium should be given to neutralise the acidæmia combined with glucose, a substance strongly recommended by Beddard on theoretical grounds.

In urgent cases these should be administered by intravenous injection, two pints of a solution containing one drachm of sodium bicarbonate and four drachms of glucose to the pint being run into the median basilic vein.

In less acute cases, or to continue the effect after intravenous infusion, repeated rectal injections of the same solution are valuable.

Where of necessity chloroform has been given in an acute septic state, the substances mentioned should be given both by the mouth and by rectum as a prophylactic measure.

CHAPTER XXX.

Obstetric Operations.

Before performing any obstetric operation it is most essential that the operator and patient should be properly prepared and the instruments sterilised.

GENERAL CONSIDERATIONS.

PREPARATION OF THE OPERATOR.

The operator should wear a linen overall, and, if possible, this should be sterilised. He must then most carefully prepare his hands and arms by thoroughly scrubbing them in hot water with a nail-brush and soap, particular attention being paid to the nails, and it is best to use running water, if such can be obtained. The soap having been removed with clean water, the hands and arms should be dried and then immersed in a solution of biniodide of mercury (1 in 2,000) for a short time, after which rubber gloves which have been previously boiled should be put on.

The use of rubber gloves is essential if the operator wishes to conform to the tenets of modern surgery, as not only can they be rendered absolutely sterile by boiling, but also by their use the hands of the surgeon are protected, an immense advantage if the case happens to be a septic one.

In the operation of turning, owing to the slippery nature of the gloves, difficulty may be experienced in catching hold of the child, in which case it may be necessary to remove them.

PREPARATION OF THE PATIENT.

It is very important for the patient to be properly prepared as follows:

The Rectum should have been emptied with a soap-and-water enema at the outset of labour. If this has not been done and the circumstances of the case permit, it is desirable to give one.

The Vulva should then be thoroughly cleansed with soap and water, and afterwards swabbed with a solution of biniodide of mercury (1 in 2,000), and if the vulval hairs are long they should

be clipped. The greatest care must be taken, as failure to render the vulva as aseptic as possible exposes the patient to very definite risks of infection.

Some authorities prefer to give a vaginal douche in all cases when operative interference is indicated; but this hardly seems necessary, except under the following definite conditions: (1) If the hand or instruments have to be inserted into the uterus; (2) if there is a vaginal discharge; (3) if the patient is known to have recently had gonorrhœa; (4) if the patient is septic from previous manipulation or neglect. In all of these circumstances a douche of a solution of biniodide of mercury (1 in 2,000) should be administered.

Following the vaginal douche, if its use is indicated, or if not, after the vulva has been attended to, *the bladder must be catheterised*, and this must never be neglected, since grave injury may be inflicted on this organ if operative measures are employed when it is full.

PREPARATION OF THE INSTRUMENTS.

The instruments must be sterilised by boiling for twenty minutes, and if a small piece of carbonate of soda is placed in the water they will not rust. After sterilisation the instruments should be put straight into a bowl of warm lysol, and kept there ready for use. The instruments after being used should be cleaned by a thorough scrubbing with soap and water, or, better still, with a solution of lysol, which is soapy in nature, antiseptic, and brightens the instruments, and then boiled.

ANÆSTHESIA.

No obstetric operation should be performed without an anæsthetic except under necessity, see p. 576.

FORCEPS.

Forceps should only be applied to the head.

INDICATIONS FOR THEIR USE.

It may be necessary to use forceps under the following conditions: (1) Because of some disproportion between the child and the maternal pelvis; (2) to assist delivery in the interests of the mother; (3) to hasten delivery in the interests of the mother; (4) to hasten delivery in the interests of the child; (5) because of some malposition or abnormality of the child.

1. Disproportion between the Child and the Maternal Pelvis.

Labour may be delayed either because the child's head is too large, the mother's pelvis is too small, or because a combination of the two exists.

Whatever the cause, the delay may take place in the pelvic cavity, at the brim, or above the brim of the pelvis.

It, of course, depends upon the amount of disproportion (in most cases the amount of pelvic contraction) as to what particular line of treatment should be followed; but as regards forceps delivery, it may be taken that with a normal-sized head, the smallest conjugate which justifies an attempt at forceps delivery is $3\frac{1}{4}$ inches, and then only very occasionally, since below $3\frac{1}{2}$ inches the fœtal mortality is markedly increased. According to the figures given by Munro Kerr the fœtal mortality down to $3\frac{1}{2}$ inches is 10 per cent., between $3\frac{1}{2}$ and 3 inches it averages 30 per cent. The danger to the mother is likewise increased below $3\frac{1}{2}$ inches. It may, therefore, be taken as a good working rule that delivery with forceps, except on the rarest occasions, should not be attempted with a conjugate below $3\frac{1}{2}$ inches, and it must be remembered that even then, if the pelvis is of a generally contracted type, a somewhat larger conjugate is advisable.

In connection with labour in cases of contracted pelvis, the figures given by Boenninghausen, and quoted by Munro Kerr, are very striking, showing as they do that the fœtal mortality for spontaneous delivery in generally contracted pelves is 2·2 per cent. and for flat rachitic pelves 2·7 per cent., while in artificially terminated labours the mortality was 41 per cent., and 47 per cent. respectively, according as the pelvis was generally contracted or flat. With a conjugate, then, down to $3\frac{1}{2}$ inches in flat pelves and $3\frac{3}{4}$ inches in those generally contracted, the labour should be allowed to terminate spontaneously if possible, as it will be safer both for the mother and child. Assistance with forceps should be given if the mother shows signs of exhaustion, the life of the child appears to be in danger, or the uterine contractions begin to fail.

The operator must, however, be particularly careful to take into account not only the size of the pelvis, but also that of the child's head, since, if the head is larger or smaller than normal, the foregoing remarks must be modified.

Delay above the Brim.—The best treatment to employ when the head is arrested above the brim, due either to its increased size or to pelvic contraction, has formed the subject of endless discussion for years, and is not even yet definitely settled. Never-

theless, whatever may be the best treatment for expert obstetricians who have passed a long term of years in the service of a lying-in hospital, there is no doubt that the majority of practitioners should not use forceps in such cases. The harm done every year by endeavours to pull children's heads past the brim by sheer force is incalculable, a marked percentage of the general maternal mortality and morbidity and of the fœtal mortality being due to such misapplied efforts.

If the pelvis and head are of normal size, and the head is floating above the brim for some reason other than disproportion, then the high forceps operation is permissible, and may be particularly indicated in such cases as hæmorrhage, eclampsia, excessive obliquity of the uterus, prolapse of the cord, or some other complication endangering the life of the mother or child.

Delay in the Pelvic Brim.—When the head is arrested in the pelvic brim, ample time should be given for the head to mould, the patient then placed in Walcher's position, and one or two efforts made to pull the head through the brim. No prolonged traction must, however, be exerted, neither must too much force be employed.

The justification for using forceps depends not entirely on the relative sizes of the pelvis or head, but also, if the delay is due to the diminished size of the pelvis, upon the shape of the pelvis.

In the case of a flat pelvis the child's head has the best chance of passing through the brim when its long diameter corresponds to the transverse diameter of the pelvis, when the anterior fontanelle is on a level with or lower than the posterior fontanelle, and when the sagittal suture is nearer the promontory of the sacrum, that is, when the presentation is what is termed an anterior parietal presentation. If the sagittal suture is nearer the symphysis pubis than the promontory of the sacrum (posterior parietal presentation), the head, unless the degree of contraction is only very slight, will be unable to slip through the brim, and if it is already tightly fixed it must be perforated, or, if the unfavourable presentation is discovered early, version is the proper treatment.

If, in addition to the flattening from rickets, there is a lateral spinal curvature (scolio-rachitic pelvis), the promontory is pushed not only forwards, but also laterally, with the result that there will be more room on one side of the promontory than the other. In this case, if the child's head is entering the brim with its occiput turned towards the side in which there is most room, well and good, the case is suitable for forceps. If, however, the occiput is pointing towards the opposite side, version is indicated, for by pulling on

that leg of the child which corresponds to the side of the pelvis in which there is most room, the occiput can be made to enter the wider space. Therefore, if there is more room on the right side of the pelvis, pull on the right leg of the child, and *vice versâ*.

Lastly, if the pelvis is of the generally contracted type, then the child's head must be markedly flexed to enable it to pass the brim.

Delay in the Pelvic Cavity.—If the head is somewhat larger than normal, or the cavity of the pelvis smaller, the head may become more or less impacted. On examination it is found not to recede in the intervals between the pains, it is more or less fixed, and the caput succedaneum is noticed to be larger than normal and increasing in size.

In this case, if the child is dead, the uterus tonically contracted, or the vagina and vulva swollen, the head should be perforated. If these conditions are absent, the forceps should be used. If by their aid no appreciable advance of the head results, then the operator has before him the alternatives of pelviotomy or craniotomy.

2. To assist Delivery in the Interests of the Mother.

When labour is delayed by uterine inertia, rigidity of the pelvic floor, faulty impact on the perineum or abnormal obliquity of the uterus, it is better to assist labour by the forceps.

Sluggish Uterus.—In this condition the uterus, although contracting, does so with less force and frequency than usual. This is the condition in which forceps are most often indicated and used. If, therefore, the cervix is fully dilated and the head, though advancing slowly, has been in the vagina for two hours, the child should be delivered with forceps.

Rigidity of the Pelvic Floor.—In certain primigravidæ, especially when comparatively old, the pelvic floor is more rigid than normal, and also in multigravidæ as the result of injury at a previous labour the soft parts at the outlet may be rigid. The birth of the head, even though it is resting on the perineum, may then be considerably delayed. In these cases, ample time must be given for the parts to dilate, failing which the head may be delivered with forceps between the pains.

Faulty Impact on the Perineum.—If the membranes rupture early and the liquor amnii drains away, the general intra-uterine pressure or guiding force is lost, and the fœtal head is pushed too far back on to the perineum by the direct uterine pressure.

This, by preventing extension of the child's neck, will cause delay

in the birth of the head and increase the liability to rupture of the perineum. By the judicious use of forceps in these cases the head can be pulled forwards, in the direction of the vaginal outlet, labour will be shortened, and the risk of perineal rupture diminished.

Abnormal Obliquity of the Uterus.—If the uterus is displaced forwards or laterally more than usual, the head may fail to engage in the brim, when, supposing the case is otherwise suitable, forceps are indicated.

3. To Hasten Delivery in the Interests of the Mother.

In such conditions as incipient exhaustion, anti-partum hæmorrhage, heart disease, phthisis, and eclampsia, rapid delivery may be indicated.

Incipient Exhaustion.—If during the second stage of labour the maternal pulse rate increases beyond 100 during the intervals of the pains, and yet no cause other than that of exhaustion can be found to account for this rise, labour should be terminated by forceps.

Ante-partum Hæmorrhage.—In accidental and unavoidable hæmorrhage, if the head is presenting, the membranes ruptured, and the cervix is fully dilated, forceps should be applied and the child delivered.

Heart Disease.—Death from heart disease during or just following labour is, as a rule, due to over-distension of the right side of the heart, and the danger of this is increased by the uterine contraction and bearing-down efforts of the patient. In these cases, therefore, when the patient is distressed, labour should be terminated by the early application of forceps.

Eclampsia.—In this disease delivery should be effected as soon as possible, but the measures employed should not add to the risks the mother is already incurring. Thus, in the second stage, forceps may be applied at once, whilst, if the first stage is slow and the case is otherwise suitable, dilatation of the cervix may be aided with a de Ribes' bag or the hand, and forceps delivery then effected.

4. To Hasten Delivery in the Interests of the Child.

If the child is subjected to prolonged pressure, as, for instance, when the membranes rupture early in the first stage; or if the cord is prolapsed or expressed, the life of the child is placed in considerable jeopardy.

Fœtal Distress.—When labour is delayed, a careful watch must be kept on the fœtal heart. Diminution and especially irregularity

of the fœtal pulse rate is a dangerous sign, and if the pulse falls to 100 between the uterine contractions, the child should be delivered forthwith.

Prolapse or Expression of the Cord.—If the cord cannot be replaced and the child is alive, forceps must at once be applied and the child delivered, always supposing the cervix is fully dilated and the head presenting.

5. Because of some Malposition of the Child.

In the following conditions forceps may be indicated :

Unreduced Occipito-posterior Presentation in a Vertex.—If the attempts at reduction of an occipito-posterior presentation by flexing the head or by manual rotation have failed, and the occiput has rotated back into the hollow of the sacrum, the head must be delivered by forceps.

In these cases most authorities are content to use simple traction, in which case the best pattern of forceps to employ is the axis-traction, since the possession in these of a universal joint allows the head to rotate during the traction.

Another method less frequently practised is to rotate the head with forceps ; but when thus employed they are very apt to slip, and may thus injure both the child's head and the mother's soft parts. Unless straight forceps are used this method has still further disadvantages, since the presence of the pelvic curve makes laceration of the soft parts more liable, and when the head has rotated, if traction is still necessary, the forceps must be removed and reapplied, although this latter drawback may be obviated by putting on the forceps backwards in the first instance.

Mento-anterior Presentation of the Face.—In cases where the face is delayed in the cavity of the pelvis and the chin is pointing forwards, the forceps may be used.

Unreduced Mento-posterior Presentation of the Face.—In mento-posterior cases attempts at reduction by extending the head or by manual rotation having failed, and the chin having rotated back into the hollow of the sacrum, forceps may be tried before perforation is resorted to unless the child is dead ; but it must be remembered that delivery by forceps in such a presentation is not only dangerous to the child, as its trachea is very apt to be compressed, but also the instrument is very apt to slip. Further delivery with the head in this position will under any circumstances severely lacerate the vaginal outlet. It is, however, a fact that very often in these mento-posterior cases the chin will turn if sufficient time is allowed. Therefore, whilst the child is alive, the application of

forceps should be delayed as long as the mother's condition warrants, and if in the end artificial delivery is a necessity, the alternative of perforation of the head should be considered.

Brow Presentation.—If the brow has entered the cavity of the pelvis and is then arrested, a trial may be given to forceps before the head is perforated, unless the uterus is tonically contracted, when no time should be wasted in attempting delivery by this means.

Delay of the after-coming Head in Breech Presentation.—In breech presentation, if the after-coming head is delayed, and delivery by the Prague method or face and shoulder traction has failed, forceps may be tried if the child is still alive.

Prolapse of the Child's Arm by its Head.—If this condition cause delay and the arm cannot be pushed up, forceps should be applied, but care must be taken that the arm is not included in the blade.

Locked Twins.—If the heads of both children are presenting, push the head of the second away and pull on that of the first with forceps.

If the first child has presented as a breech and the second as a vertex, and manipulation has failed to disentangle their heads, the first child having been decapitated, the second child is delivered with forceps, after which the decapitated head of the first child is extracted.

CHOICE OF FORCEPS.

The best pattern of forceps to use is that known as axis-traction forceps. With this instrument traction can be applied to the greatest possible advantage, because the force will be acting in the true axis of the genital canal, and also the head will be able to rotate freely. Again, as the traction is exerted in the best direction, the amount of force required is very much reduced, so that the liability of injuring the mother or child is diminished. Lastly, the operator is able to use the right hand only for traction, leaving the left free to make counter pressure on the buttocks.

Axis-traction forceps are more difficult to apply for one who has been used to simple, long curved forceps. There is, however, no particular difficulty, and one can learn to pass them quite as easily as any other pattern.

Owing to the presence of the traction rods the instrument takes up rather more room, and these together, with the handle to which their ends are united, make the instrument rather more complicated and troublesome to clean.

POSITION OF THE PATIENT.

In Great Britain the patient usually lies in the left lateral

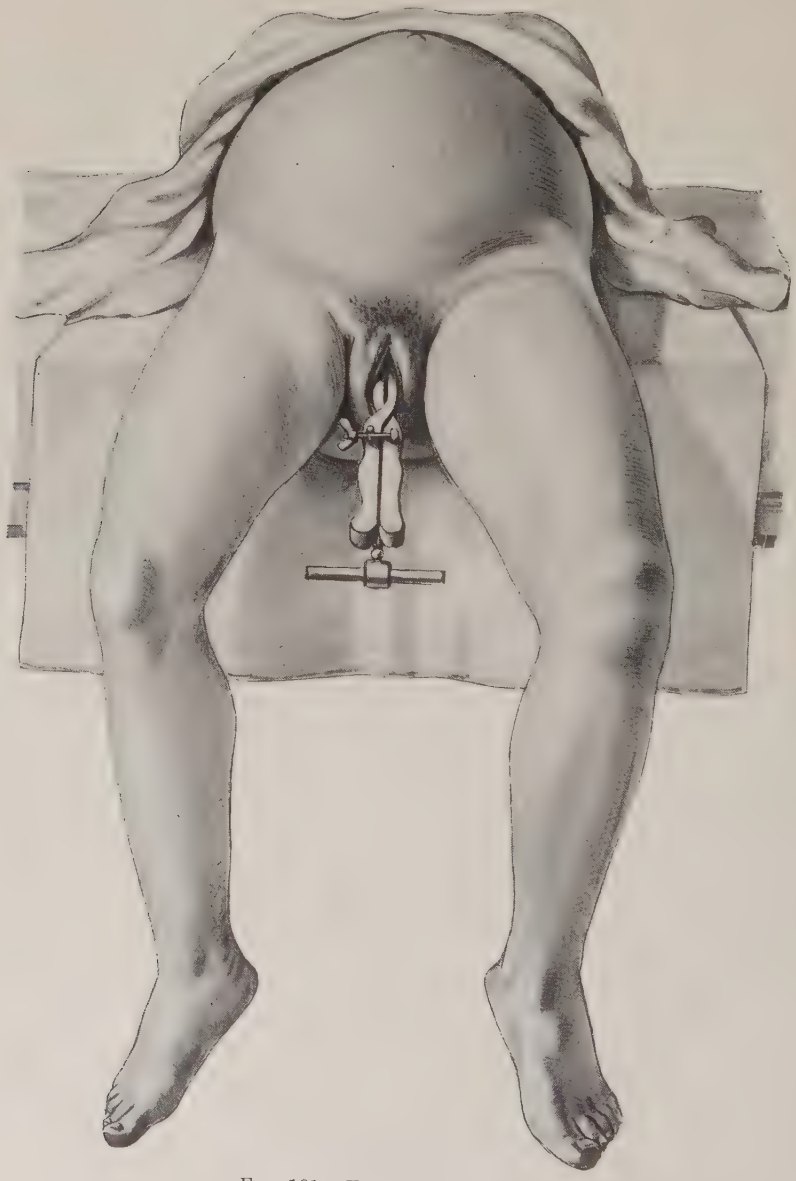


FIG. 181.—Walcher's Position.

position with her body across the bed, her buttocks at the edge of the bed, and her thighs flexed on the abdomen.

Walcher's Position.—If the forceps are being applied at the brim of a contracted pelvis, Walcher's position is undoubtedly the best for the patient to assume, since it increases the diameter of the true conjugate at least a quarter of an inch. Also, although the head may have entered the brim, it may be only partly engaged, in which case, if the patient is in the left lateral position, the head tends to slip out of the brim.

In Walcher's position the patient lies on her back across a high bed or table, with her buttocks projecting over its edge and her legs hanging free. As this position also decreases the size of the outlet the patient must return to the left lateral position after the head has passed the brim. The operator will have to sit on a low stool whilst he is pulling the head past the brim (Fig. 181).

POSITION OF THE CHILD.

The presentation should be accurately determined before the preparation of the patient, and the diagnosis then be made absolute by the introduction of the hand into the vagina just before the blades of the forceps are applied. It sometimes happens that during the time occupied in preparing the patient the presenting part has changed. Neglect to ascertain the exact state of affairs with which the operator has to deal may result in forceps being applied to the head in a position in which delivery is out of the question, or even, under a mistaken diagnosis, to parts other than the head.

CONDITION OF THE CERVIX, UTERUS, AND MEMBRANES.

If the uterus is in tonic contraction, forceps are not indicated, but the head should be at once perforated. As a general rule, the forceps should never be applied until the cervix is fully dilated. If the cervix is found to be soft, thick, and easily dilatable, no harm will result if the forceps are applied and gentle traction is made before the os is quite full size; but if the cervix be rigid, laceration is certain.

CONDITION OF THE CHILD.

If forceps are indicated, and before they are applied, the fœtal heart should be carefully examined. If the child is dead, the head should be perforated to lessen the risk of damaging the mother. If the fœtal pulse rate is becoming slower between the pains, this is an indication that delivery should be terminated as soon as possible consistent with the safety of the mother.

During the forceps delivery, the nurse should prepare two baths, one warm and one cold, in which the child, if asphyxiated, may be immersed if necessary, see p. 734.

POST-PARTUM HÆMORRHAGE.

The danger of post-partum hæmorrhage is perhaps a little increased with forceps delivery, more especially if chloroform has been administered or it has been necessary to deliver the child in the absence of uterine pains. The operator should therefore be particularly careful to control the uterus, and to ensure beforehand that there is ready an ample supply of hot water, that the douche

Fig. 182.—Introduction of Lower Blade.

apparatus is in working order, that a suitable douche is prepared, and that a dose of ergotin is ready to hand, see p. 274.

METHOD OF APPLYING THE FORCEPS.

Introduction of the Lower Blade.—The operator passes as much of his left hand as may be necessary into the vagina with the palmar surface looking upwards until the finger-tips impinge on the lower side of the head, where this is in contact with the cervix or vagina, according to whether the cervix has retracted above the head or not. The finger-tips are then gently insinuated between the cervix or vagina and head.

The lower blade, being held lightly in the right hand with the handle somewhat raised and pointing forwards, is then passed along the palmar surface of the left hand until the point impinges on the angle between the fingers and child's head (Fig. 182). The handle is now carried gently upwards and backwards and then downwards

and backwards until the shank rests against the perineum, when the blade, if properly applied, will be lying between the left side of the pelvis and the child's head, in which case the outer surface of the handle will be looking directly upwards (Fig. 183). The handle should then be kept in position by an assistant, so that the shanks is in contact with the perineum ; failing this the operator must keep the blade steady with his left wrist whilst the upper blade is being passed.

Introduction of the Upper Blade.—The position of the left hand is now reversed, so that the palmar surface looks downwards, and the finger-tips are applied to the upper side of the head.

The upper blade, being held lightly with the handle pointing forwards and somewhat downwards, is passed gently along the

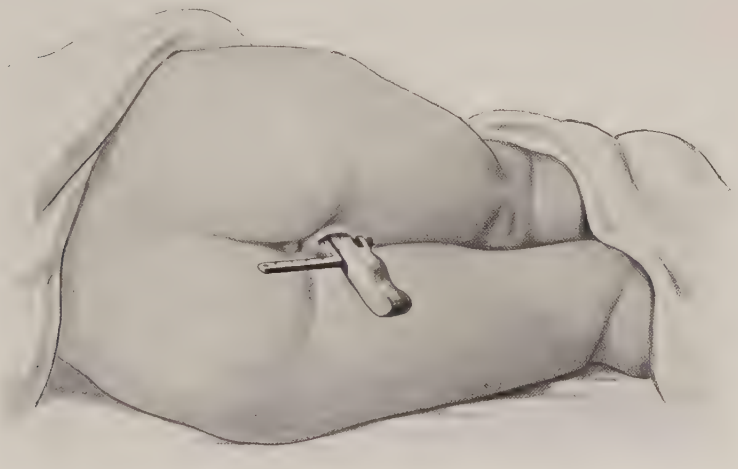


Fig. 183.—Lower Blade introduced.

palmar surface of the left hand until the point impinges on the angle between the fingers and the child's head (Fig. 184).

The handle is now carried downwards and backwards and then upwards and backwards until it comes in contact with the handle of the lower blade, and, if properly applied, the blade will be lying between the right side of the pelvis and the child's head, and the outer surface of the handle will be looking directly downwards.

Axis-traction forceps are preferable to simple long curved forceps, for they not only allow of traction being made on the axis of the upper part of the genital canal but they also enable the operator to utilise his left hand to countersteady the buttocks against the pull of his right.

Whichever pattern is used the method of application is the same. In axis-traction forceps the traction rods are attached to the

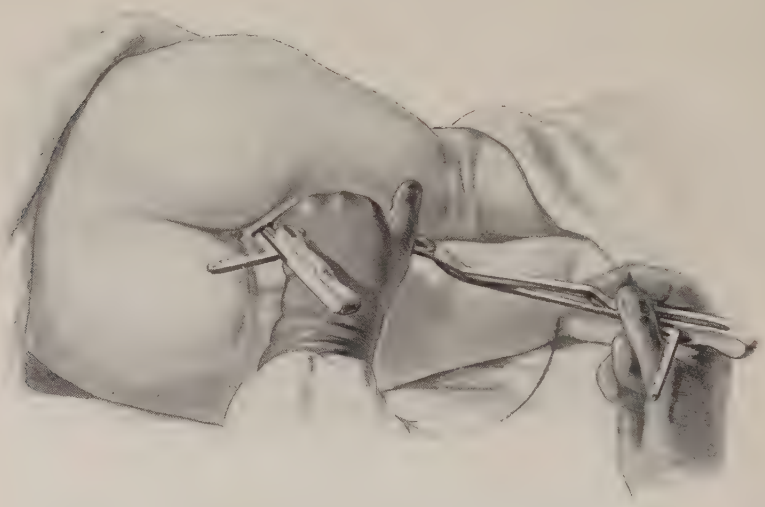


FIG. 184.—Introduction of Upper Blade.

blades beforehand and held in contact with the handles when being passed.

Locking the Blades.—The blades should now lock without any

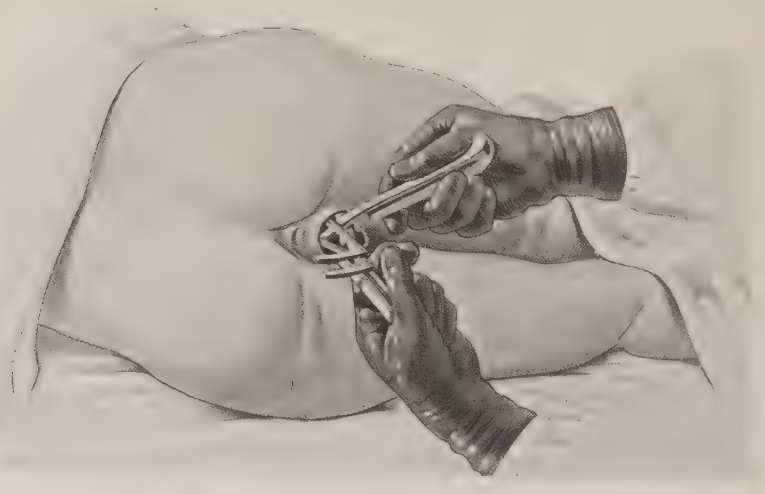


FIG. 185.—Locking the Blades.

trouble (Fig. 185). Difficulty may be experienced if the blades have not been passed the same distance, and consequently each half of the

lock is not in apposition. In this case either one blade should be withdrawn a little or the other pushed in. Again, the blade may have rotated after its introduction, so that the outer surface of the handle does not look directly upwards, and this is more likely to happen if the help of an assistant to hold the lower blade firmly in position has not been available. In this case the blade may be very gently rotated back to the right position, or the malposition may be rectified by carrying both shanks firmly back against the perineum, or it may be necessary to remove the blades and reapply them. After the

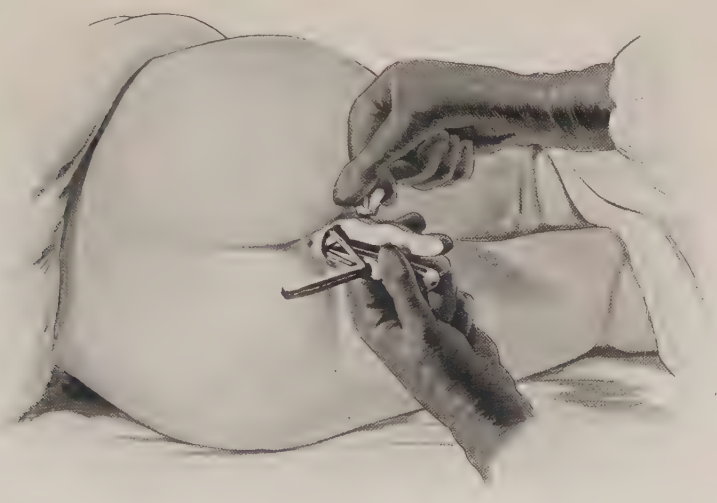


Fig. 186.—Adjusting the Screw.

blades are locked, a careful examination should be made to ensure that only the child's head is grasped by the forceps.

Method of Extraction.—If the Simpson-Barnes pattern of the long curved forceps is being used, and this is the best, the middle finger of the left hand is placed in the loop of the shank, and the index and third fingers rest on the shoulders of the handles, whilst the handles are held firmly with the right hand.

Direction of Traction.—The proper line of traction is constantly shifting, since it should be in that axis of the genital canal in which the head is lying at the moment it is being pulled upon, so that when the head is high up at the brim, traction is exerted directly backwards in a line joining the umbilicus and coccyx, and then as the head descends the line of traction is gradually advanced forward, so that at the end the handles are guided over the maternal

abdomen (Figs. 188 and 189). Traction, as a rule, should only be made during a pain. If for any reason, however, it is desired to deliver the child quickly, then the efforts at extraction should be intermittent, some interval being allowed between the pulls in the interests of the child.

When the forceps are being used to overcome resistance of the soft parts, traction may be employed in the intervals of the pains so as to gradually stretch the perineum, and this will lessen the chance of its rupture. When the head has been brought down on the perineum, the forceps may be removed, and the uterus allowed

Fig. 187.—Traction with Right Hand. Counter-pressure with Left Hand.

to expel the child. If, however, it is decided to deliver the head with forceps, the nurse must raise the upper leg of the patient, and when the head commences to escape from the vulval orifice, the operator should remove his left hand from the forceps and with it press the head forward, whilst with his right hand he should take hold of the handles in such a way that instead of pulling on them he pushes them towards the mother's abdomen.

Strength of the Pull.—The amount of force to be applied cannot be exactly indicated; it will vary with the case, and is purely a matter of experience. It is certainly quite unjustifiable for the operator to employ such a force that can be obtained by counter-pressure with his foot against the side of the bed. The force should

not be greater than that which a man of average strength can exert with his two forearms.

Action of Forceps.—Forceps can be used as tractors, compressors, levers, and rotators. The principal use they are put to is to effect traction. Compression should only be called into action during traction. The necessity for the leverage action is very rare, and the advantage gained is not very marked, whilst the danger of lacerating the genital canal is very great; it should, therefore, only be employed by a very experienced operator.

Position of the Blades of the Forceps to the Maternal Pelvis and Fœtal Head.—In forceps delivery as practised by the great majority of practitioners, the blades are passed so that they may lie in direct relation with the sides of the pelvis, without any consideration as to the position of the child's head. In the majority of cases forceps are applied for delay in the second stage of labour, when the head of the child is low down and the occiput has rotated forwards, in which case the blades of the forceps will also be applied to the side of the child's head, in this instance, then, in the best position.

Again, when the head is arrested in the transverse diameter of the brim, the best position of the blades for the child's head necessitates their being applied at the sides of the pelvis. Thus it comes about that in most cases, without any particular knowledge or direct intention on the part of the operator, the forceps are applied in the best position both for the mother and child. Many authorities, however, have considered that an attempt should always be made to apply the forceps in the best position for the child, maintaining that if this is not done, and the forceps are applied in the usual way to the sides of the pelvis, quite irrespective of the position of the child's head, the pressure of the blades may alter the position of the child's head for one that is not so suitable. The antero-posterior diameter of the head may lie in three positions: oblique, transverse, and antero-posterior.

Oblique.—If the delay is at the brim, and the head is occupying one oblique diameter, the child's head may be grasped transversely, that is, in the best position, if the forceps are applied so that the blades lie in the other oblique diameter, that is to say, with the patient in the left lateral position, and, for example, a first vertex presentation, the lower blade should be over the left sacro-iliac synchondrosis and the upper blade over the right ilio-pectineal eminence.

If the delay is at the outlet and the occiput has not yet quite rotated forwards, the forceps may be applied in a similar way.

Transverse.—If the head is delayed at the brim, and is lying in a transverse diameter, the blades are best applied one over the occiput, and the other over the face, which will result if the forceps are applied in the usual way.

Antero-posterior.—The blades should be applied to the sides of the head, as they will be if the forceps are passed in the manner about to be described.

Axis-traction Forceps.—Both blades are introduced in a similar way to those of the long curved forceps, the traction rods being attached and held by the right hand in contact with the handles.

The traction rods are then pulled behind the handles, the blades

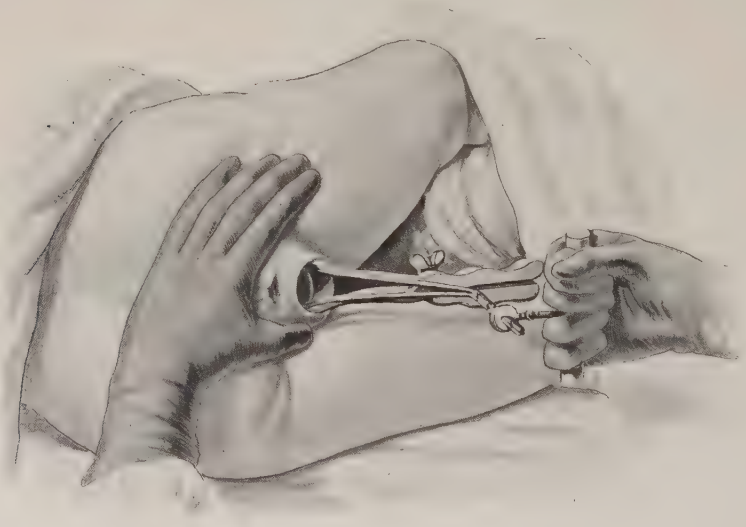


Fig. 188.—Bringing the Line of Traction forward.

are locked, and the screw is turned until the handles are sufficiently fixed. The traction handle is lastly fixed to the end of the rods (Fig. 186).

When delivering with axis-traction forceps, traction should be made with the right hand, and the left used to make counter-pressure on the buttocks (Fig. 187). The position of the handles acts as a guide to the direction in which traction is to be made; the traction rods should therefore be kept about a quarter of an inch from the shanks of the forceps.

The screw must be loosened during the interval of the pains, or if the pains are absent, during the intervals of traction. When the head is at the outlet the forceps should be removed, though, if necessary, delivery is easily completed with their aid.

Forceps in Occipito-posterior Positions of the Vertex.—In this position it is best to use axis-traction forceps, as then, if the occiput tends to rotate as it is coming down, there is nothing to hinder it from doing so. If the long curved forceps are being used, and it is noticed that the occiput has rotated they should be taken off and reapplied.

Forceps in Delay of the after-coming Head in Breech Presentation.—Delivery by the Prague method or by jaw-and-shoulder traction having failed, the forceps can be applied if the head has passed the brim. In this case, if the occiput is anterior, the

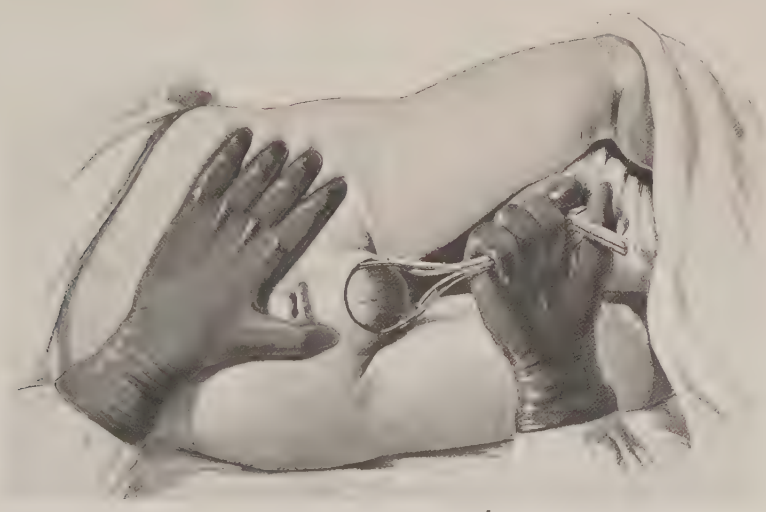


FIG. 189.—Extraction of the Head.

arms and legs of the child must be carried by an assistant as far forwards as possible between the mother's legs, after which the forceps are applied posterior to the child's body.

If the occiput is posterior, then the body of the child must be carried back as far as possible, and the forceps are applied in front of the child's body.

DANGERS OF FORCEPS DELIVERY.

To the Mother.

If the cervix is not fully dilated there is great danger of serious laceration, and many cases of rupture of the uterus are due to the careless use of forceps under these circumstances.

The vagina and vulva may be badly torn during forceps delivery

if the blades slip, or if there is any marked disproportion between the head of the child and the pelvis of the mother, or during the delivery of an unreduced occipito or mento-posterior position.

The operator should be careful to stand firm during traction. A slip has resulted in the shanks of the forceps suddenly impinging on the vulva, severely lacerating it. This slip is more likely to occur if a piece of oilcloth or a rug has been placed at the side of the bed for the operator to stand upon.

Serious laceration may also result if the forceps are used as levers to rotate the head.

The blades of the instrument have been forced through the vaginal vault into the peritoneal cavity by careless operators.

Post-partum hæmorrhage may result if the child is delivered too quickly or in the interval of a pain.

Unless the greatest care is taken in the preparation of the patient and the instruments, sepsis may result, and unless the bladder is emptied before extraction it may be torn, and a vesico-vaginal fistula result.

To the Child.

There is a definite risk to the child during forceps delivery, the number of children lost as the result of this operation approaching 8 per cent. Death is due to fracture of the skull, hæmorrhage into the brain, meningeal hæmorrhage, and asphyxia from compression. In addition, facial paralysis, cephal-hæmatoma, and laceration of the scalp may result.

VERSION OR TURNING.

INDICATIONS.

Version may be employed in the following circumstances:

Malposition of the Child.

Breech in a Primigravida; Transverse; Face; Brow; Prolapse or Dorsal Displacement of the Arm.

Anti-partum Hæmorrhage.

Unavoidable Hæmorrhage; Accidental Hæmorrhage.

Contracted Pelvis: Flattened Variety.

Prolapse of the Umbilical Cord.

To hasten delivery.

In the Interests of the Mother; In the Interests of the Child.

Double Monsters.

Thoracopagus; Dicephalus.

VARIETIES.

There are two kinds of version:

Cephalic Version, in which the head of the child is made to present in place of some other part of the child which is presenting.

Podalic Version, in which the breech of the child is made to present.

METHODS.

There are three methods of turning the child:

External Version, in which the operator uses both his hands externally.

Bipolar Version, when the operator, with one hand in the vagina and two fingers through the cervix, turns the child with the aid of the other hand used externally.

Internal Version, when the operator passes one hand through the cervix into the uterus, and uses his other hand externally.

COMPARISON OF THE METHODS.

External version is the safest. Bipolar version is the most difficult. Internal version is the easiest but the most dangerous.

DIFFICULTIES.

A diminished amount of liquor amnii increases the difficulties of all the methods, as does increased frequency of the pains and rigidity of the abdominal muscles and uterus.

DANGERS.

The patient may be infected during bipolar or internal version. The uterus may be ruptured during the performance of internal version. The child may be asphyxiated during the extraction after podalic version.

CONTRA-INDICATIONS.

Version should never be attempted during a pain, as it is then impossible, and the uterus may be ruptured in the attempt; still less should it be attempted if the uterus is tonically contracted, because the uterus will surely rupture under such stress.

Podalic version should not be performed in a patient with a small round pelvis, since no advantage is gained thereby; in fact, as the head may have to be perforated it is a positive disadvantage.

Version should not be attempted with a hydrocephalic child, or when the presenting part has entered the cavity of the pelvis.

Version should not be attempted in a flattened pelvis with a conjugate diameter smaller than 3¼ inches.

PRELIMINARY CONSIDERATIONS.

The steps to be taken with respect to the preparation of the patient and operator have already been detailed in the remarks under General Considerations. The operator should particularly remember to give a vaginal douche of 1 in 2,000 biniodide of mercury if bipolar or internal version is about to be performed, to lessen the danger of infection when the fingers or hands are passed into the uterine cavity.

In all methods it is of prime importance that the position of the child should be accurately determined before an attempt is made to turn it.

CEPHALIC VERSION.

By this operation the head of the child is made to present.

INDICATIONS.

A transverse position of the child, the mother's pelvis being normal.

A breech presentation of the child, the mother being a primigravida.

Cephalic version may be performed by the external method or the bipolar method.

EXTERNAL CEPHALIC VERSION.

External cephalic version will only be performed before rupture of the membranes, and preferably before the onset of labour.

Position of the Patient.—On her back with her buttocks a little raised, her thighs fixed, and her abdomen uncovered.

Position of the Operator.—On one or other side of the patient, facing the foot or top of the bed, whichever he prefers.

Steps of the Operation.—1. With one hand the operator pushes the head of the child towards the brim of the pelvis, and with the other hand he pulls the breech towards the fundus of the uterus (Fig. 190).

2. When the head presents it should be pushed into the brim of the pelvis, and kept there by means of an abdominal binder.

If labour has commenced, the patient should be kept on her back unless there is an abnormal lateral obliquity of the uterus, in which

case the patient should lie on the side opposite to that of the uterine obliquity.

The membranes should be ruptured when the os is fully dilated.

Difficulties.—These may be due to: (1) Rigidity of the abdominal and uterine muscles. It is this condition which makes external cephalic version always difficult, and sometimes in a primi-

Fig. 190.—External Cephalic Version.

gravida impossible. This rigidity may be overcome by placing the patient fully under an anæsthetic.

2. A small amount of liquor amnii. If the quantity of liquor amnii is small before rupture of the membranes, or if the membranes have ruptured and the liquor amnii has escaped, it may be impossible to perform external cephalic version. An expert operator may, however, be successful when the membranes have only very recently ruptured.

3. Fixation of the presenting part of the brim. If the breech or shoulder has sunk into the brim, external version may be impossible until one or other has been lifted out. This difficulty may be overcome in two ways: either by the operator lifting the

child up with both hands before trying to turn it, or by postural treatment of the mother. In the latter case the mother may be placed in the Trendelenburg position, as suggested by Pollock, or in the lateral position, on that side to which the head is directed.

4. Recurrence of the displacement. If the malposition is discovered before term, its tendency to recur may be combated by pushing the head into the brim and applying a tight abdominal binder. If, in spite of this, the position of the child changes, external version may be again employed, and as, on account of the absence of internal manipulations, there is no danger of infection, there need be no hesitation in repeating the operation whenever necessary.

5. Difficulty in turning. In spite of an anæsthetic the operator may find that he cannot turn the child, in which case he may be successful with the aid of an assistant, who, standing on the opposite side of the patient, will endeavour to move one end of the child whilst the operator tries to move the other.

BIPOLAR CEPHALIC VERSION.

The advantage of this method of turning is that when external version is impossible it can be carried out much earlier in labour and with less risk of sepsis than internal version.

Indications.—A transverse position of the child, the mother's pelvis being normal.

Time for Operating.—Preferably before rupture of the membranes, although bipolar version may be successfully accomplished if the membranes have only recently ruptured.

Position of the Mother.—The patient may be placed in the left lateral position with her thighs well flexed, or she may be placed in the dorsal position. In England the lateral position is usually chosen. In any case, the buttocks must be drawn down to the edge of the bed.

Position of the Operator. –If the patient is on her left side, the operator stands on her right side, passes his right hand into the vagina, and places his left hand over the abdomen.

If the mother is on her back, the thighs must be kept flexed by assistants whilst the operator stands between them. That hand is passed into the vagina, the palmar surface of which will correspond to the abdomen of the child.

Steps of the Operation.—1. The operator with one hand in the vagina passes his first and second fingers through the cervix, supporting the uterus with the other hand externally.

2. The two fingers of the internal hand, having touched the

shoulder, push it towards the breech, whilst the external hand pushes the head towards the pelvic brim (Fig. 191).

3. When the head has been pushed over the pelvic brim the

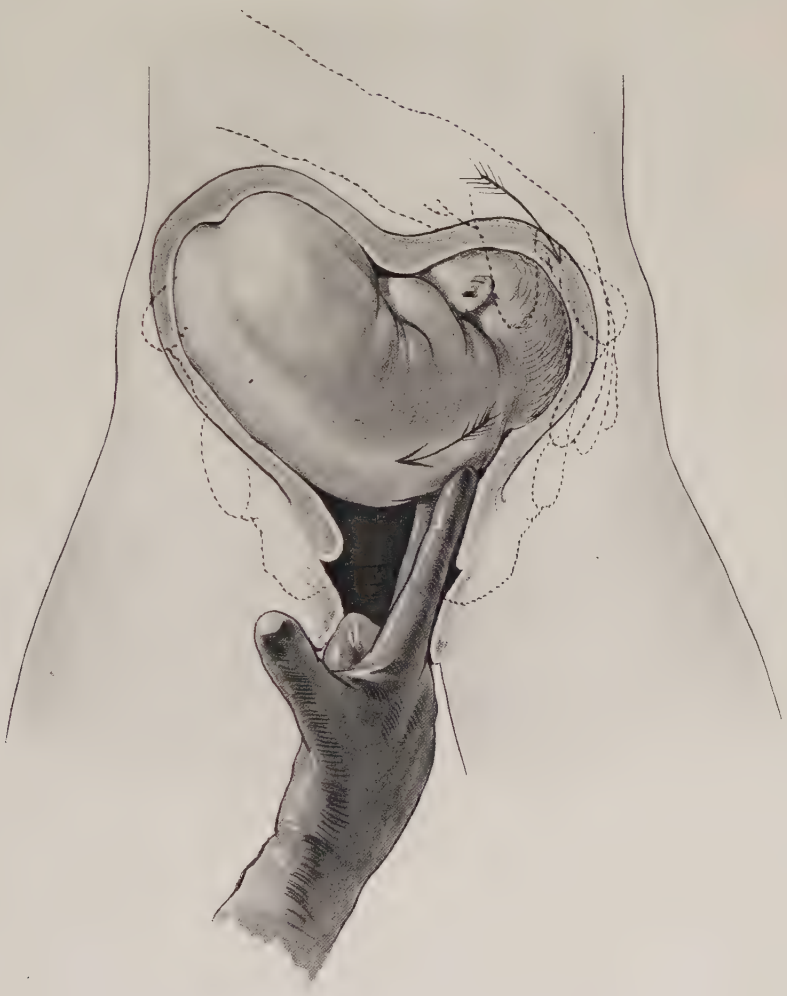


FIG. 191.—Bipolar Cephalic Version, pushing down the Head.

external hand is transferred to the breech and pushes it up towards the fundus (Fig. 192). The same measures are then taken, if necessary, to keep the head in position as described in External Cephalic Version.

Difficulties.—1. Those due to rigidity of the abdominal and

uterine muscles and to a deficiency of liquor amnii, as mentioned under Cephalic Version.

2. Insufficient dilatation of the os. An expert operator can perform bipolar version with one finger through the cervix.

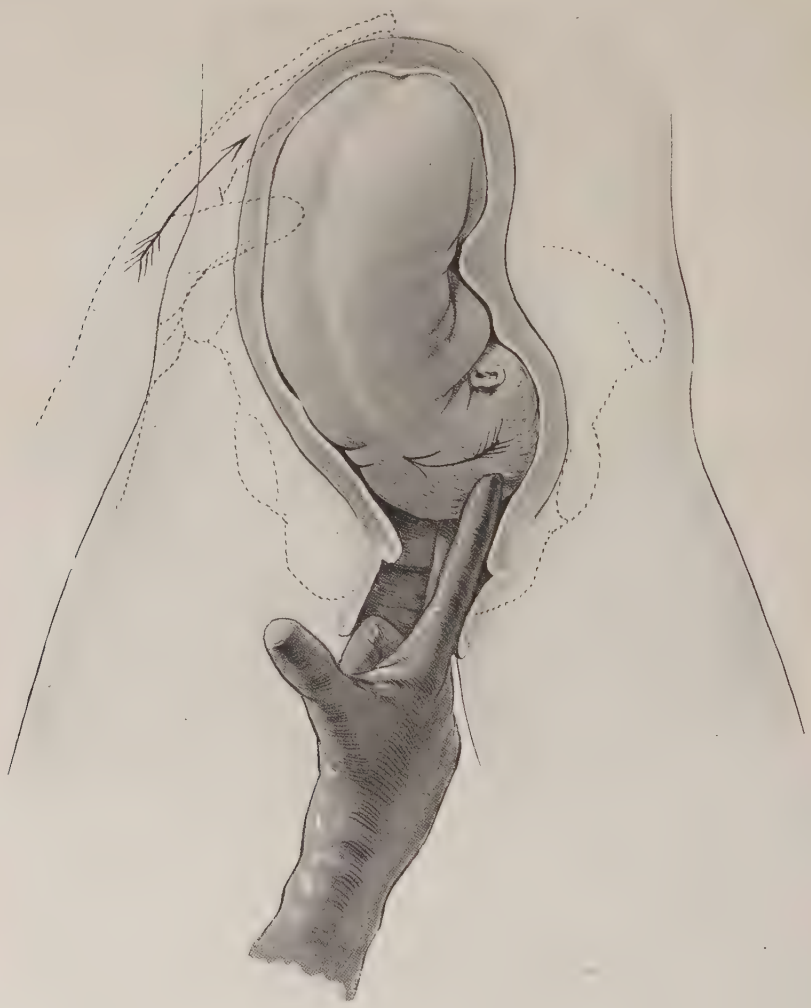


FIG. 192.—Bipolar Cephalic Version, adjusting the Head over the Cervix.

3. The breech does not rise to the fundus.

In such cases, after the head is placed over the os, the internal hand has to be withdrawn, and with it the breech pressed towards the fundus, whilst the other hand is keeping the head stationary.

PODALIC VERSION.

By this operation the breech of the child is made to present.

INDICATIONS.

1. **Malpresentations of the Child, the Mother's Pelvis being normal.**

In this group fall such complications as a transverse presentation, cephalic version having failed; a face presentation that will not enter the brim; a brow presentation when seen early in labour; prolapse of the arm in face presentation, and in vertex presentations when the head is high up and reposition and forceps have failed; or dorsal displacement of the arm, reposition and forceps having failed. In certain cases of prolapse of the umbilical cord, the child being alive, when manual or instrumental reposition has failed and the os is not sufficiently dilated to allow of immediate delivery with forceps, podalic version is advocated by many authorities; but the treatment in most cases will prove disappointing, on account of the delay in delivery of the head due to the cervix not being sufficiently dilated. If, in addition to the prolapse of the cord, the face is presenting above the brim and reposition has failed, podalic version is indicated.

2. **Flattened Pelvis, with a Conjugate of not less than $3\frac{1}{4}$ Inches and no other Contraction.**

Version under the above conditions has, as a rule, a higher fœtal mortality than when forceps are used, so that as a routine practice it is not advisable. If, however, the head is entering the brim and there appears to be more room on one side of the sacrum than the other (scolio-rachitic pelvis), and the occiput is not directed to that side, podalic version is indicated, the right leg of the child being brought down if there is more room on the right side of the pelvis, and *vice versâ*. In posterior parietal presentation forceps are of little use, and unless the head is fixed, podalic version is the best treatment. If placenta prævia complicates, the contracted pelvis version is indicated.

3. **Ante-partum Hæmorrhage.**

In placenta prævia the only drawback to podalic version is the high fœtal mortality (at least 50 per cent.); otherwise it is a safe and efficient treatment and the most easy of application, since treatment by de Ribes' bag, which is probably the best method because of the lowered fœtal mortality attending its use, necessitates the possession of this article and special forceps to introduce it, see p. 263.

When, in accidental hæmorrhage, plugging the vagina or rupture of the membranes does not arrest the hæmorrhage, the child can be delivered by podalic version, see p. 254.

4. Prolapse or Expression of Cord.

When the cervix is sufficiently dilated and the child is alive, and the cord prolapses or is expressed, delivery is often best effected by version, see p. 418.

5. Forced Delivery.

It is sometimes necessary in the interests of the mother to deliver the child as quickly as possible *per vias naturales*. As examples of this may be mentioned rare cases of eclampsia, heart disease, and pernicious vomiting. In such cases, when the cervix has been dilated, the quickest way to deliver the child is by podalic version, perforating the after-coming head if necessary. If the child is alive, it must, however, be remembered that it will have more chance of survival if delivered by forceps.

6. Locked Twins.

A very rare variety of locked twins is that in which the after-coming head of the first child gets impacted with the shoulder and prolapsed arm of the second child which is lying transversely. The treatment in such a case is to decapitate the first child, deliver the second one by version, and lastly, the decapitated head by pressure, forceps or perforation as the case may be.

7. Double Monsters.

There are two varieties of double monsters in which it may be necessary to perform podalic version. In the first variety the twins are united along more or less of their trunks (*Thoracopagus*), and in such a condition, if the heads are presenting, it is best, if possible, to perform podalic version, the reported cases which have been delivered spontaneously being expelled breech first. In the second variety there is a single body with two heads (*Dicephalus*). If the heads present, labour is almost certain to be obstructed, in which case the first head must be decapitated and the monster then delivered by podalic version.

Podalic version may be performed by the bipolar method or the internal method.

BIPOLAR PODALIC VERSION.

This method is best performed after labour has commenced, before rupture of the membranes, and when the cervix will admit two fingers. An expert operator may be successful, even when the cervix will only admit one finger, and after the membranes have

ruptured, but there must be sufficient liquor amnii for the child to move easily.

Position of the Mother.—See Bipolar Cephalic Version.

Position of the Operator.—See Bipolar Cephalic Version.

FIG. 193.—Bipolar Podalic Version. Pushing the Head away from the Cervix in the direction of the Occiput.

Steps of the Operation.—This depends somewhat upon whether the head or shoulder is presenting.

When the Head is Presenting.

1. The operator with one hand in the vagina passes his first and second fingers through the cervix, supporting the uterus with his other hand externally,

2. With his fingers inside the uterus he pushes the child's head in the direction of its back so as to get its knees over the os, and with his external hand he presses the breech down to the opposite side (Fig. 193).

3. The operator next loops his internal fingers into the popliteal space and pulls the child's knee through the os and then brings

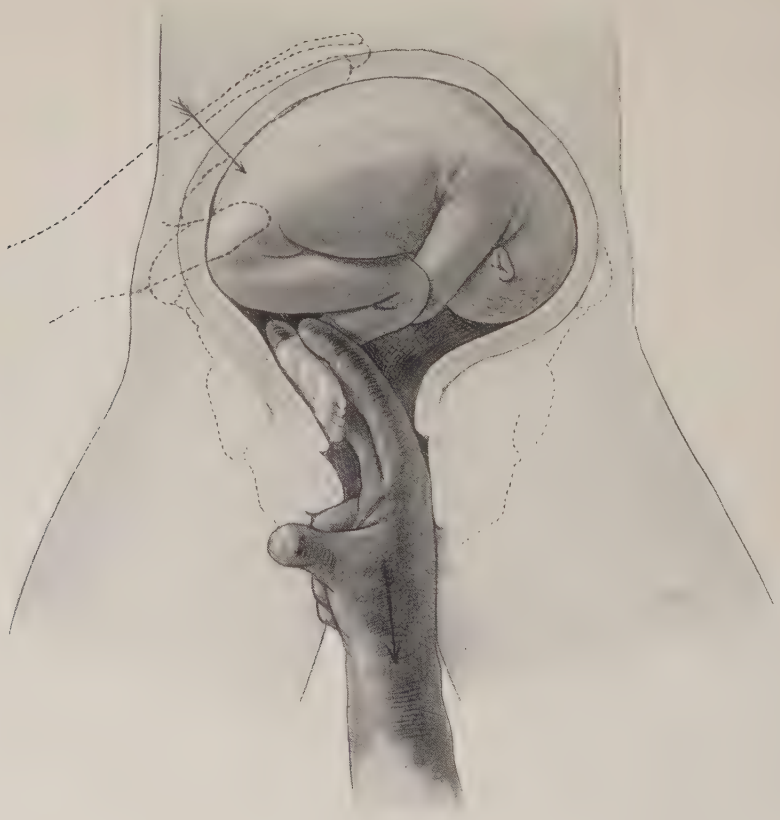


FIG. 194.—Bipolar Podalic Version. Seizing the Foot.

down the foot outside the vulva until the half breech enters the cervix, at the same time pushing the head up towards the fundus with his external hand; or he may rotate the child till a foot comes within reach and bring that down in a similar way (Figs. 194, 195).

When the Shoulder is Presenting.—The only difference in this case is that the internal fingers impinge on the shoulder instead of the head, and the first step, therefore, consists in pushing the shoulder towards the head with the internal fingers. The remain-

ing steps of the operation are the same as those described for head presentation.

DIFFICULTIES.

1. **Too Little Liquor Amnii.**—If the quantity of liquor amnii is

FIG. 195.—Bipolar Podalic Version. Bringing the Leg down.

insufficient, it may be found very difficult or even impossible to rotate the child. In the former case the steps of the operation are rather more numerous, since the child, after the head is pushed

away, may not rotate readily enough to allow of the knee or foot presenting at once, but the shoulder or some other portion of the trunk will present first, and must in its turn be pushed towards the head (Fig. 196).

2. **Too much Liquor Amnii.**—If there is an excessive amount of

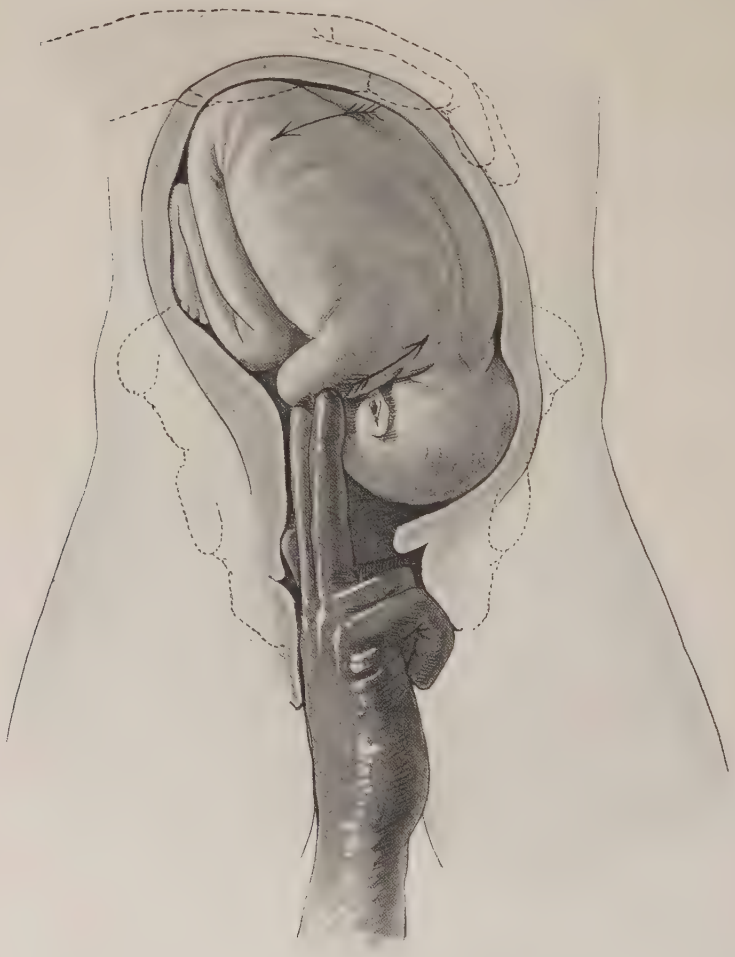


FIG. 196.—Bipolar Podalic Version. Pushing the Shoulder towards the Head.

liquor amnii, the child may rotate too easily, when it may be found impossible to seize hold of the knee. In this case the membranes should be ruptured and some liquor amnii allowed to escape before the version is repeated, the hand being kept in the vagina meanwhile.

3. **Mistake in Diagnosing the Child's Knee.**—The knee may be mistaken for the elbow, the foot for the hand, and the fingers for the toes. It is important that the operator should make certain that he has got hold of the knee before he attempts to pull it through the os. It must be remembered that the knee points towards the head, the elbow away from the head; the foot has a heel and the toes are not so long as the fingers, nor is the great toe separated from its fellows as the thumb is from the fingers.

4. **The Child's Head will not Rise to the Fundus.**—If the leg is not pulled well down so that the half-breech enters the os, the head may not rise to the fundus properly, and the child may remain in a bad position.

INTERNAL PODALIC VERSION.

This may be necessary when the head or shoulder of the child is presenting.

When the Head is Presenting.

TIME FOR OPERATING.

Internal version may be and generally is essayed after the membranes have ruptured so long as the contra-indications mentioned under General Considerations are absent. It is, of course, more easily performed before the membranes have ruptured. The cervix must be dilated sufficiently to admit the hand of the operator.

POSITION OF THE MOTHER.

The position of the mother is not a matter of much consequence, the left lateral position being that most usually favoured. Some advantage may be gained by choosing the position of the mother according to the position of the child. Thus, if the child's head is to the right, version will be easier if the woman is placed on her left side, and *vice versâ*.

POSITION OF THE OPERATOR.

If the mother is on her left side, the operator stands on her right and uses his right hand internally, or *vice versâ*.

If the woman is on her back, either hand can be used internally. It is better to use that hand which corresponds to the side to which the child's legs are directed.

STEPS OF THE OPERATION.

When the Head is Presenting.—1. During the interval of the pains one hand is passed with the fingers and thumb approximated

gently into the vagina, through the cervix, pushing the head on one side into the uterus. The membranes are ruptured if they are intact. The external hand supports the uterus and presses it down somewhat to relieve the tension on its attachments (Fig. 197).

2. The internal hand is passed up towards the fundus with its

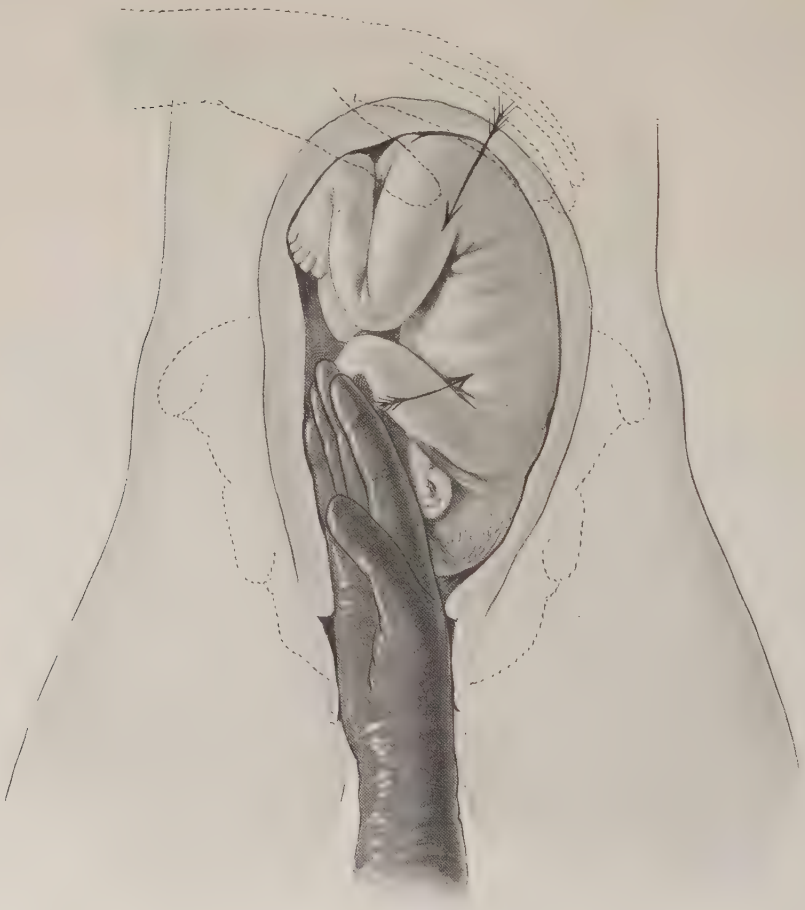


Fig. 197.—Internal Podalic Version. Passing in the Hand.

back against the internal surface of the uterus till a foot or knee is reached. The external hand supports the uterus (Fig. 198). Whichever leg is touched first should be pulled upon (Fig. 199), except in the case when there is more room on one side of the pelvis than the other, when it is better to pull on the leg corresponding to that side of the pelvis which is largest, as by doing so the occiput

eventually rotates into it. It is immaterial whether the knee or foot is seized; whichever is first encountered may therefore be chosen.

3. The internal hand pulls the foot or knee through the os till

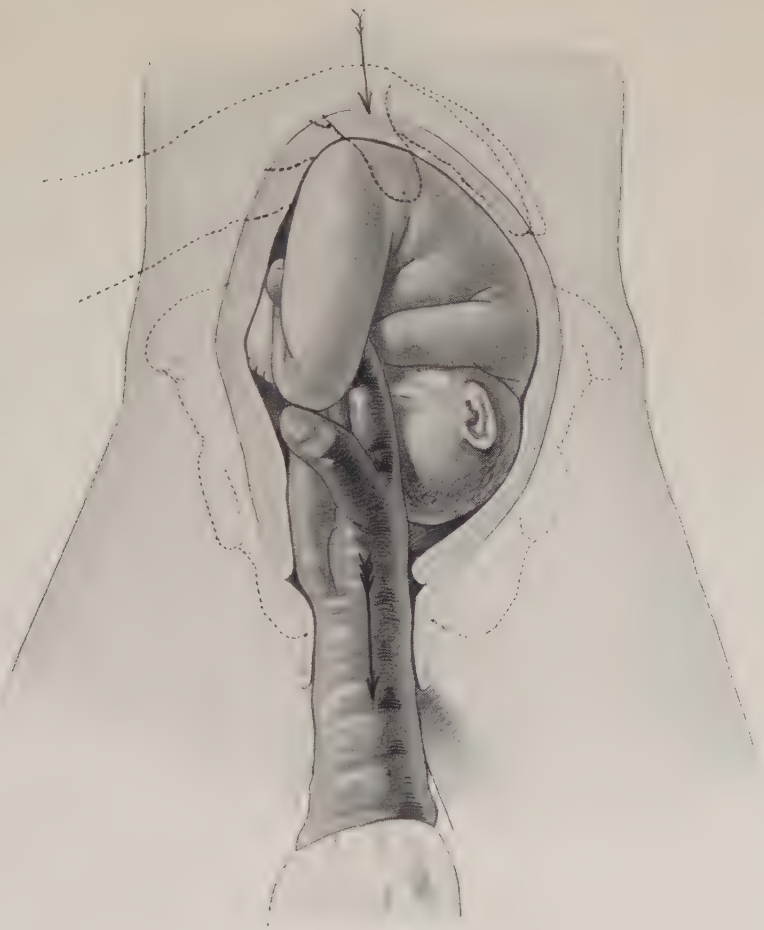


Fig. 198.—Internal Podalic Version. Seizing a Knee.

the half-breech enters it, and the external hand at the same time pulls the head towards the fundus (Fig. 200).

4. The child can then be delivered if necessary by traction on the leg combined with pressure on the fundus.

5. After the child is delivered, a hot intra-uterine douche of 1 in 4,000 bionodide of mercury should be given.

When the Shoulder is Presenting.—The steps of the operation are the same as when the head presents, except that the internal

hand, instead of pushing aside the head as it passes into the uterus, pushes aside the shoulder. If an arm is prolapsed, a tape should be tied round the wrist (Fig. 201), and some authorities recommend that the arm should, if possible, be brought down for this purpose,

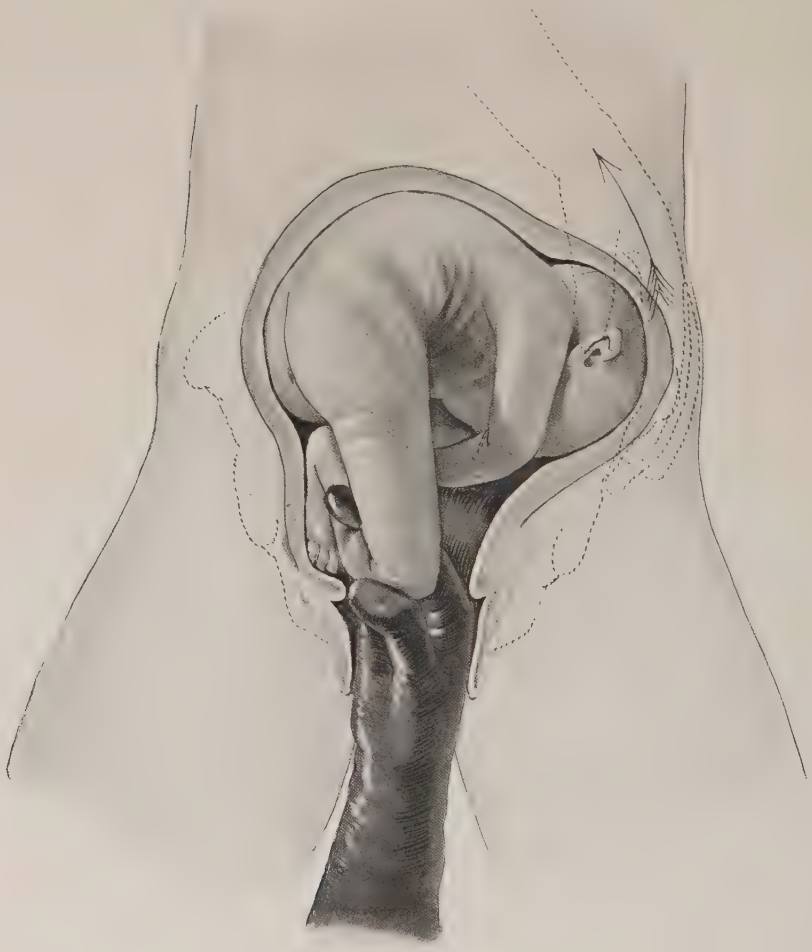


FIG. 199.—Internal Podalic Version. Traction on the Knee.

then as the lowest leg (that is, the one corresponding to the prolapsed arm) is pulled upon, it will come forward, as also will the prolapsed arm, which, being kept down by slight traction on the tape, cannot become extended (Figs. 202, 203). By this manœuvre it is possible to prevent the anterior arm from becoming extended,

which is an important point, as when the arms are extended it is the anterior one that is most difficult to bring down.

Some authorities contend that in transverse presentations with

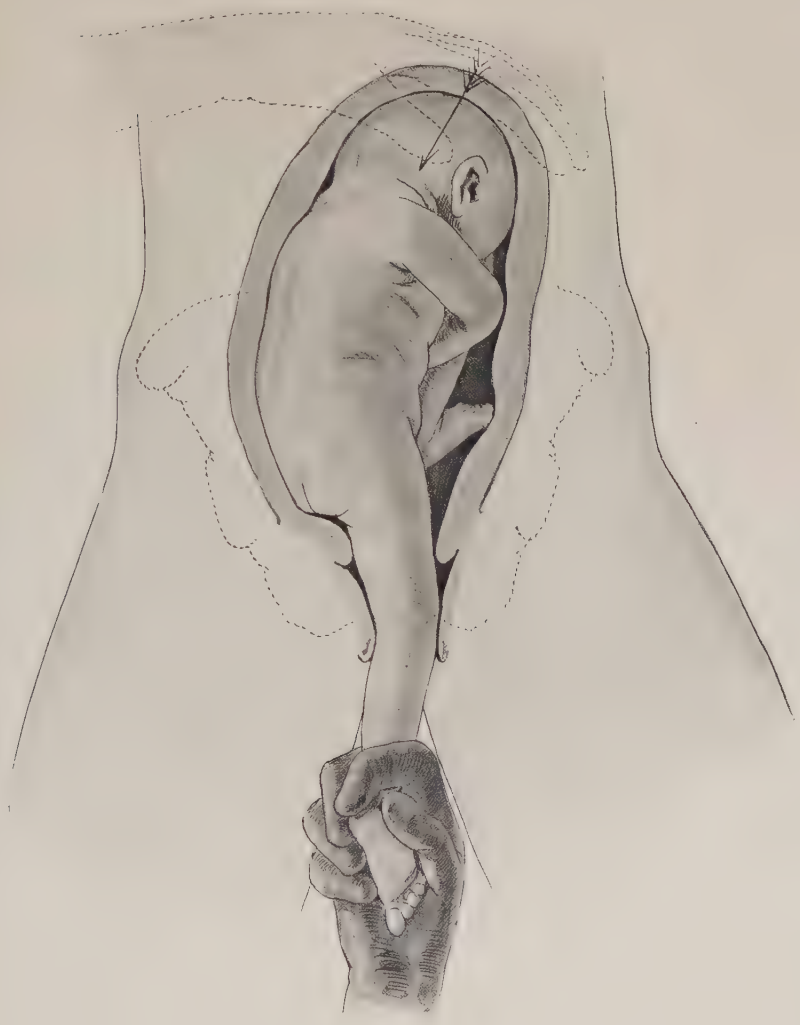


Fig. 200.—Internal Podalic Version. Bringing down the Leg.

the back of the child posterior, if the upper leg is pulled upon the child can be delivered more easily, because there will be no chance of the upper buttock catching against the brim of the pelvis.

DIFFICULTIES.

1. Diagnosing the foot or knee, see Bipolar Podalic Version.

2. Escape of the liquor amnii and rigidity of the uterus. If the liquor amnii has drained away and the uterus has contracted

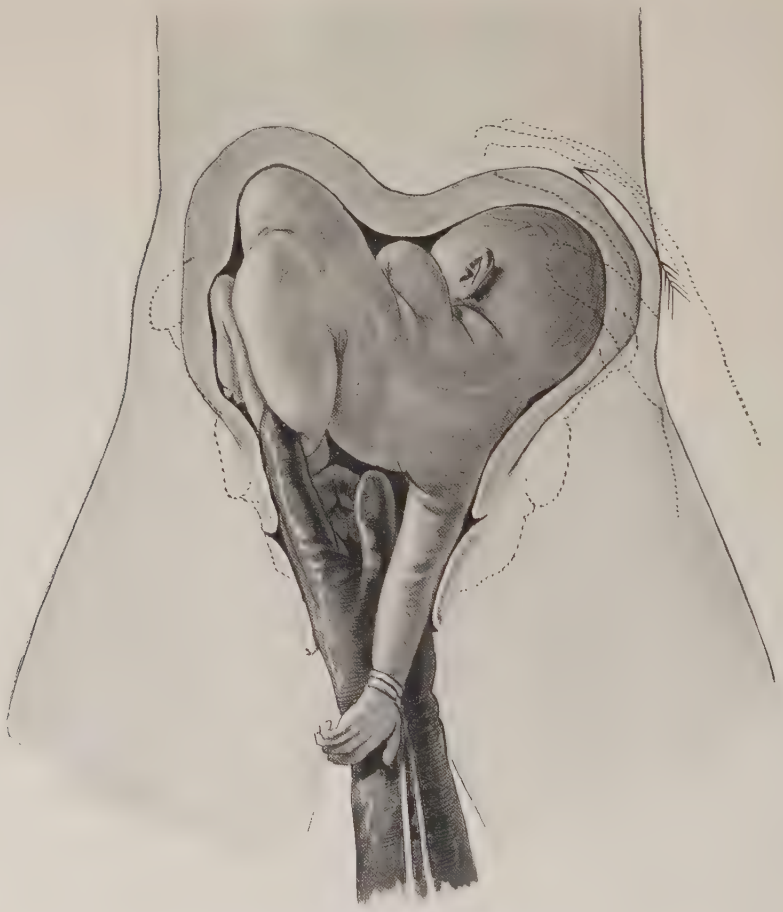


FIG. 201.—Shoulder Presentation. Internal Podalic Version, Tape applied to prolapsed Arm, catching hold of Leg.

round the child, internal version may be impossible by the method just described. In fact, as already indicated, it must never be tried if the uterus is tonically contracted or there is a ring of Bandl, since the uterus will surely be ruptured. If, however, these contra-indications are absent, then the following methods must be

employed: (*a*) Traction with tape.—A piece of tape is fastened round the foot (Fig. 204), and whilst the tape is pulled upon with one hand, the other hand can be passed into the vagina and used to push up the shoulder (Fig. 205). (*b*) Traction with a blunt hook. —A blunt hook covered with a piece of indiarubber tubing can be

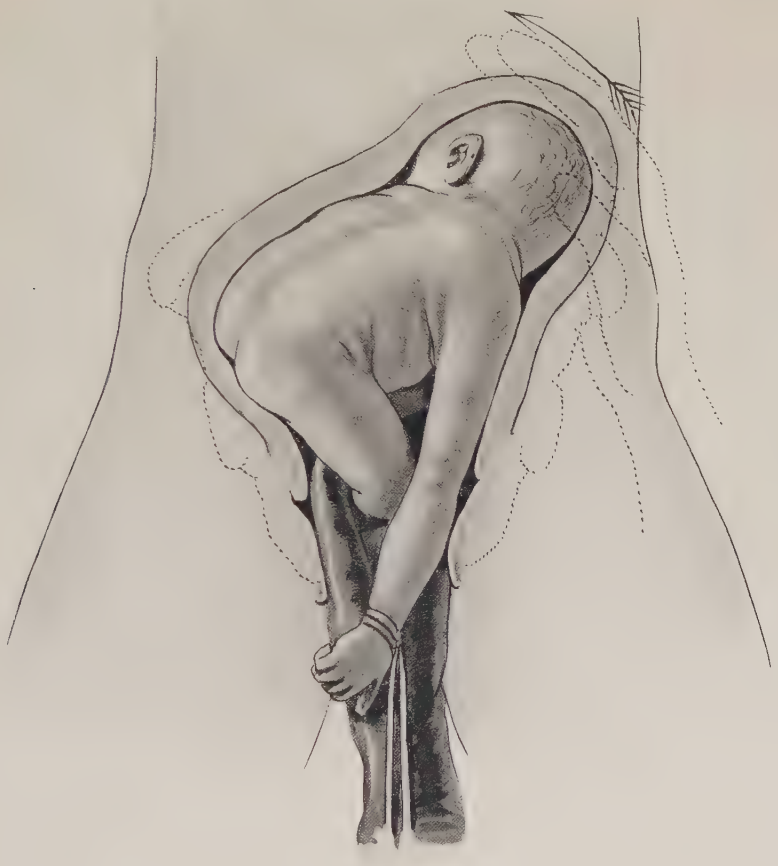


Fig. 202.—Shoulder Presentation. Internal Podalic Version, pulling down the Leg.

passed round the back of the knee, care being taken that its end does not impinge on the popliteal space (Fig. 205); both hands can then be used in a similar way to that described in the preceding section. (*c*) Traction on both legs.—If the above methods fail, both feet can be brought down, when very powerful traction can be applied. The operator must be careful to remember these

additional methods are dangerous unless the greatest care is used and the patient very deeply anæsthetised.

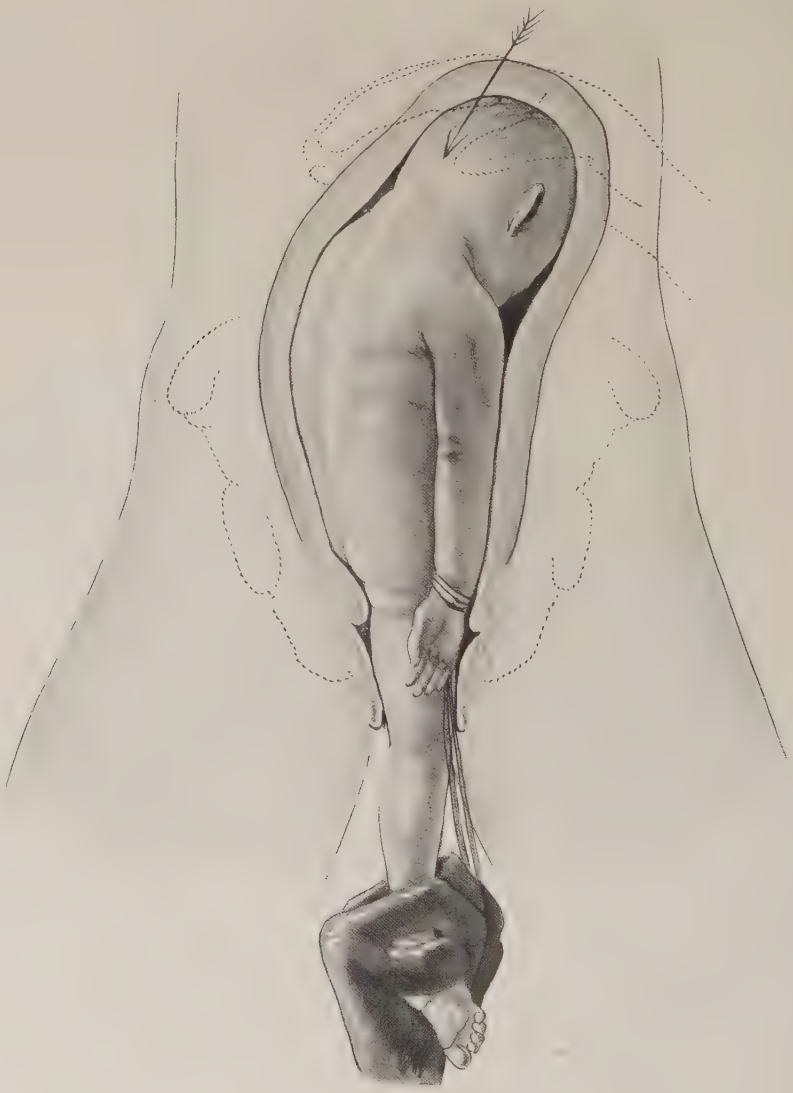


FIG. 203.—Shoulder Presentation. Internal Podalic Version, the Leg brought down.

DANGERS.

Besides the dangers mentioned under General Considerations, the operator must be careful not to pass the hand through the

cervix too quickly or before it is properly dilated, otherwise he may severely lacerate it; he should also always support the uterus with his free hand and press it gently down whilst the hand is being

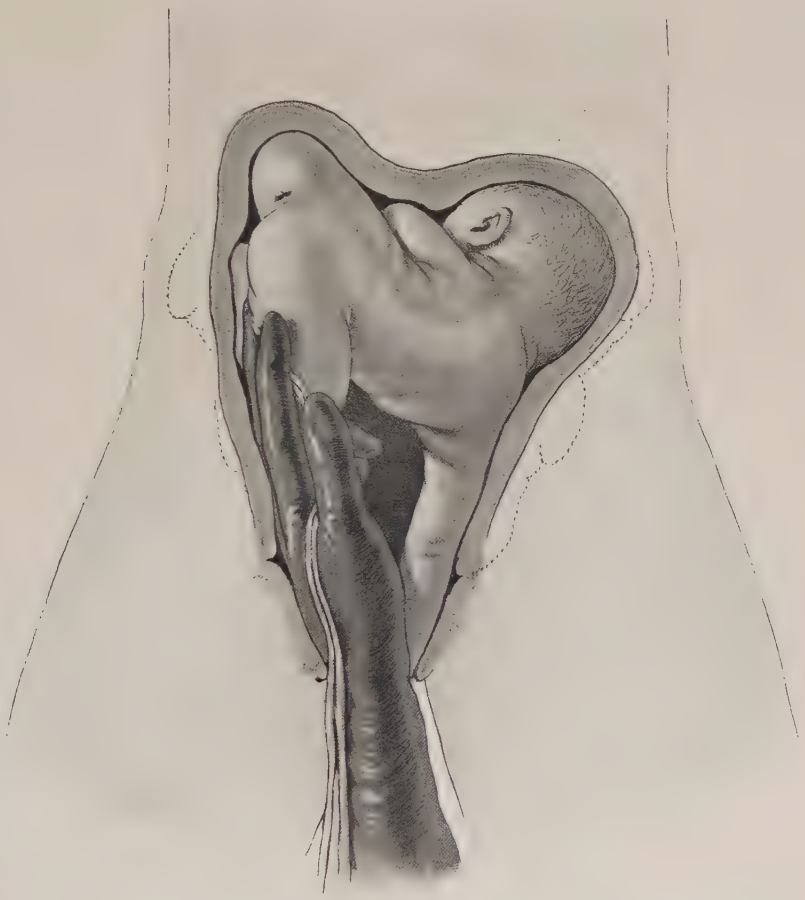


FIG. 204.—Shoulder Presentation. Impacted Shoulder, no Tonic Contraction of the Uterus, application of Noose to the Knee.

passed into the uterus, otherwise there is a very real danger that the uterus may be torn from its attachments.

The child may be asphyxiated during the extraction.

CRANIOTOMY.

Craniotomy is an operation which is now very much less often resorted to than was formerly the case, because it is held that the

life of the child should not be sacrificed if it can be saved by any other method of delivery, always supposing that the risk to the mother is not thereby increased. In recent years the perfecting

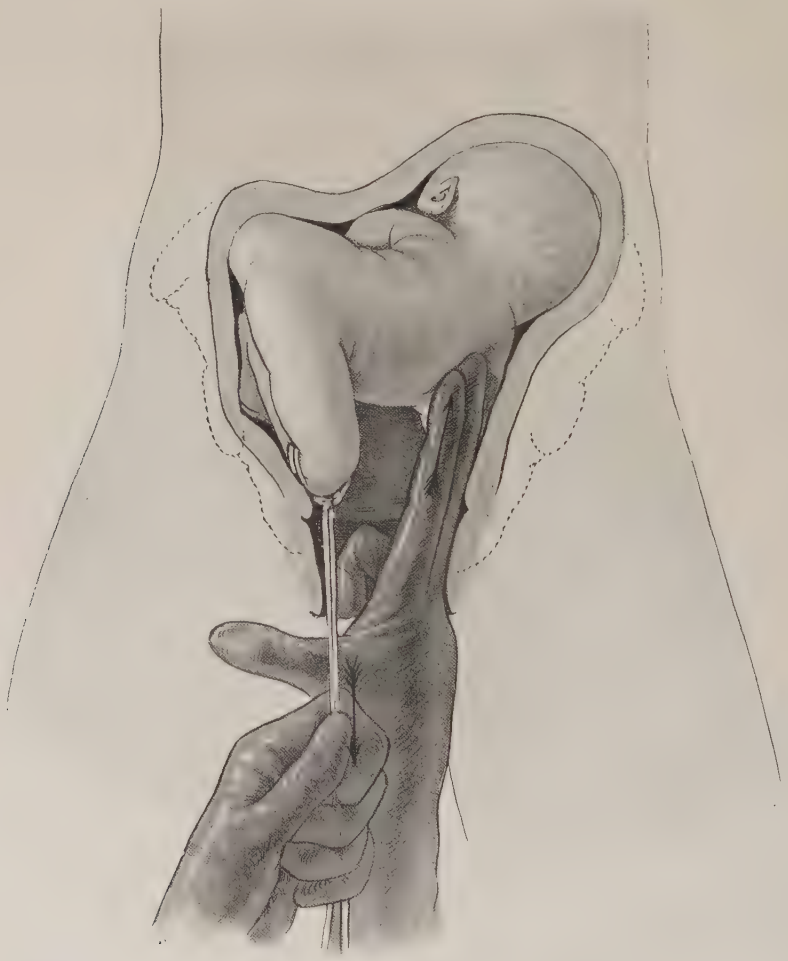


FIG. 205.—Shoulder Presentation. Impacted Shoulder, no Tonic Contraction of the Uterus, Traction on the Knee by the Noose.

of surgical technique has made Cæsarean section so safe that with a few exceptions it is a preferable operation to craniotomy. In very prolonged labour the child is apt to be born dead, or to survive its birth but a very short period. In such a case craniotomy may be the best treatment, as of course it is if the child is dead or the

mother is septic, unless this operation subjects the mother to a greater risk than Cæsarean section.

Fig. 206.—Shoulder Presentation. Impacted Shoulder, no Tonic Contraction of the Uterus, Traction on the Knee with the blunt Hook.

INDICATIONS.

If the child is dead and its delivery by craniotomy does not endanger the mother more than Cæsarean section,

Hydrocephalus.

When repeated attempts have been made to deliver the child

either by forceps or version, and these have failed. In such cases the child is probably injured and the genital canal probably infected.

When in obstructed labour it is obvious from the condition of the patient that the genital canal has been infected.

In maternal complications, such as eclampsia, heart disease, and ante-partum hæmorrhage, when it is necessary to deliver the child as quickly as possible, the cervix not being sufficiently dilated for delivery by forceps and Cæsarean section being contra-indicated.

In certain cases when the labour is obstructed by a contracted pelvis, tumours of the pelvic bones, fibroids of the uterus, solid or cystic ovarian tumours, cancer or organic rigidity of the cervix, and then only if Cæsarean section or cœliotomy, as the case may be, has been refused. Delivery by craniotomy should not be attempted in a contracted pelvis if the antero-posterior diameter at the brim is less than $2\frac{1}{4}$ inches, for, although it can be accomplished with a conjugate as low as 2 inches (if the transverse diameter measures 4 inches) by an expert operator, the mortality resulting is so great (38·5 per cent. according to the latest statistics) that Cæsarean section even under adverse circumstances is a safer operation. The proper treatment for tumours obstructing labour is to remove them, if possible, and then deliver the child, the alternative treatment of craniotomy being, apart from the sacrifice of the child, contra-indicated, since the tumour during the extraction of the child may be injured and the mother's life consequently endangered.

Some cases of vertex, breech, and brow presentation. In cases of unreduced occipito-posterior and unreduced mento-posterior presentation, craniotomy must be performed if the other methods of delivery by rotation or axis traction forceps have failed.

In breech presentation, impaction from extension of the head or the occiput not rotating forwards may render craniotomy necessary. In any case of delay of the after-coming head craniotomy should be performed when it is apparent that the child is dead.

In brow presentation, if treatment by rectification or version fails or cannot be attempted because the head has advanced too far, craniotomy is indicated, except rarely when forceps may be successful.

Locked twins. When both heads present and lock, if the head of the second child cannot be pushed out of the way, and forceps applied to the first head fail to deliver it, craniotomy will have to be performed on the first child. Similarly when the after-

coming head of the first child is arrested by a transverse lie of the second, and the head of the first child must be perforated.

PREPARATION OF THE PATIENT AND OPERATOR.

See remarks under General Considerations.

PREPARATION OF THE INSTRUMENTS.

See remarks under General Considerations.

POSITION OF THE PATIENT AND OPERATOR.

The patient should be placed in the lithotomy position. In the absence of a Clover's clutch the thighs may be kept flexed by a bandage or "jack-towel" or they may be held by the nurse.

STAGES OF THE OPERATION.

Perforation.

Vertex and Brow Presentations.—1. If the head is above the brim, an assistant should push on the fundus of the uterus so that the head may be fixed. If the head is impacted on the pelvis, there is no need to use counter pressure.

2. The operator passes his left hand into the vagina and puts two fingers on the anterior parietal bone, keeping to the centre of the os uteri.

3. He then holds the perforator as depicted in Fig. 207 and passes it up to the skull, guarding its point with the left hand during its passage up the vagina.

4. Having drawn back the instrument to the perineum so that the point of the instrument may impinge on the skull at right angles, the operator with firm and steady pressure bores through the parietal bone (Fig. 208). It is better to bore through a parietal bone than a fontanelle, since the hole resulting will not close when the instrument is withdrawn.

5. The instrument having been pushed into the skull as far as its "shoulders," its blades are separated by approximating the handles and then closed, after which the instrument is turned a $\frac{1}{4}$ circle and the blades again separated. By this means the hole is crucially enlarged (Fig. 209). The blades are then closed and the perforator is pushed on into the brain, which is destroyed (Fig. 210). Special care should be taken to break up the medulla oblongata, otherwise, if the head is delivered quickly, the child may cry. The crotchet is a better instrument to destroy the brain with than the perforator, and with it also a good deal of the brain can be scraped away.

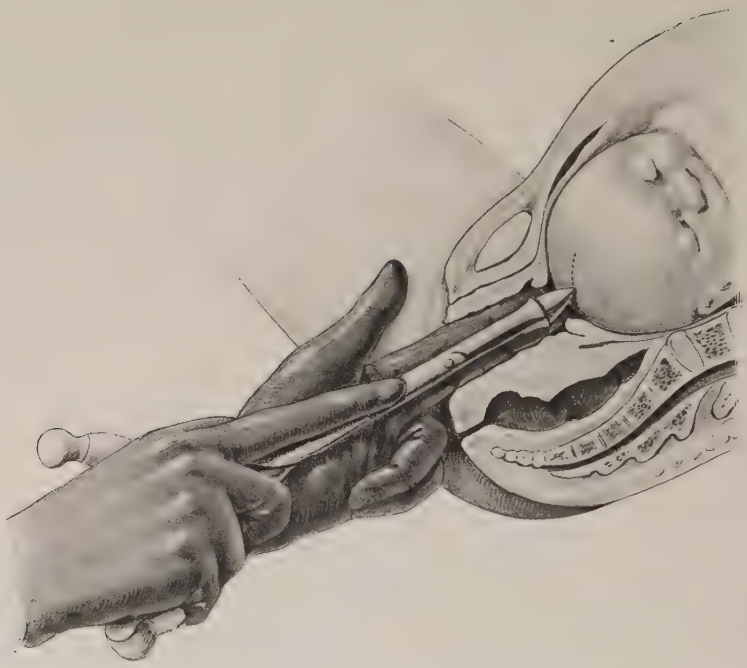


FIG. 207.—Applying the Perforator.

6. The best way to remove the brain after it has been broken up is by a stream of water delivered into the cranial cavity through

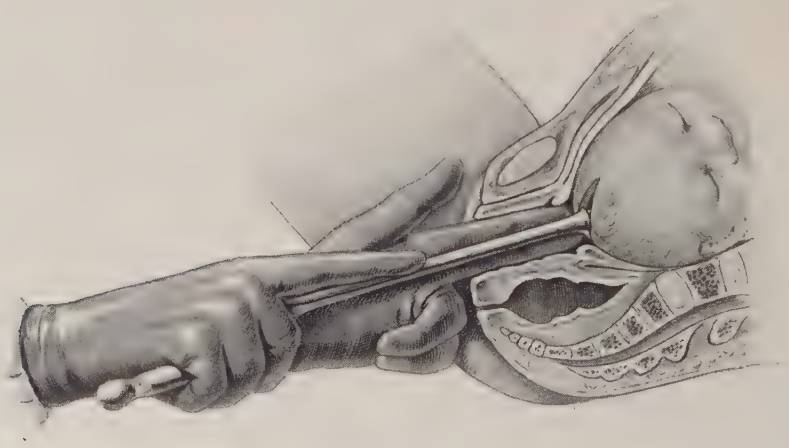


FIG. 208.—Perforating the Skull.

the perforation hole by means of a douche. It is not, however, necessary to do this.

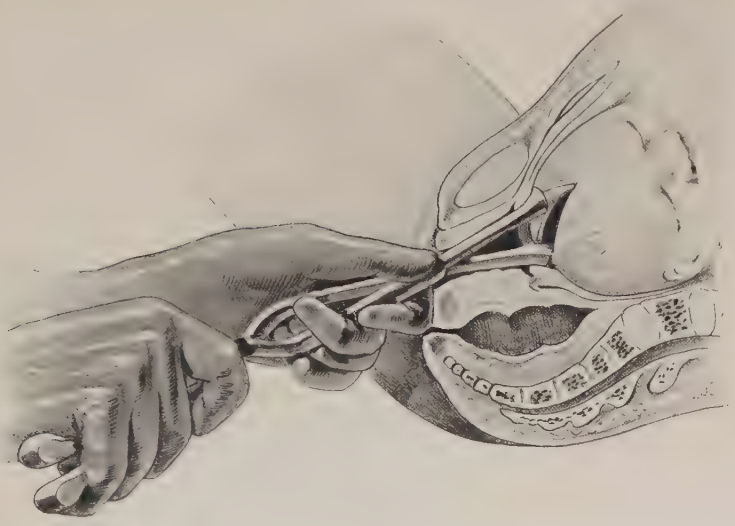


FIG. 209.—Making the Crucial Incision.

Face Presentation.—In this case the roof of the mouth or the orbit should be perforated.

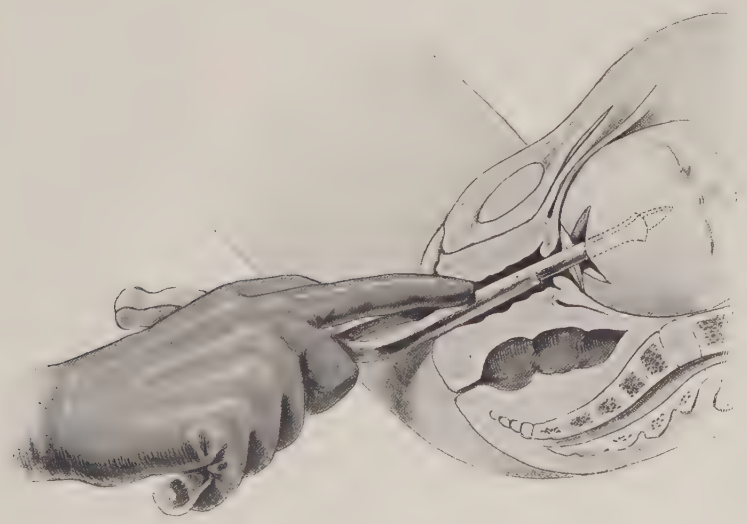


FIG. 210.—Destroying the Medulla.

Breech Presentation.—If the after-coming head gets impacted the skull must be perforated through the occipital bone or mouth.

Dangers in Perforating.—The operator must be very careful not to mistake the promontory of the sacrum for the head.

If the perforator is pushed forwards with a jerk its point may slip off the skull and seriously damage the bladder or vagina.

Crushing.

To reduce the size of the skull after it has been perforated it must be crushed. This crushing may be effected either through the means of the pelvis or by some special instrument, according to which method of delivery is chosen.

Pelvic Crushing.—If the child is delivered by the craniotomy forceps, these will simply act as tractors and the pelvis will do the crushing.

Instrumental Crushing.—The cranioclast, cephalotribe, and three-bladed cephalotribe act as crushers as well as tractors.

Extractions.

The various methods of extracting the child after perforation will now be described. Of these the most generally useful are by means of the cephalotribe and cranioclast.

Cranioclast.—This instrument has taken the place of the old-fashioned craniotomy forceps, since it can be used both as the craniotomy forceps and for the operation of cranioclasm, for which it was devised. The best instrument is that designed by Roper.

Used as Craniotomy Forceps.—When used in the place of craniotomy forceps, the cranioclast acts as a tractor only.

1. The left hand is passed into the vagina and the fingers carried up to the hole made by the perforator.

2. The solid blade, guided by the right hand, is introduced through the perforation hole with its toothed surface looking towards the occipital or frontal bone, preferably the former, and held in position.

3. The fenestrated blade is then gently inserted between the fingers and the scalp over the occipital or frontal bone, according to whether the toothed surface of the solid blade is directed towards one or the other (Fig. 211).

4. The handles are next screwed tightly together.

5. The head is now delivered by traction in the axis of the genital canal, care being taken to ascertain meanwhile that the instrument is not slipping or the genital canal is not being injured by the lacerated edges of the skull (Fig. 212).

Used as a Cranioclast.—The operation of cranioclasm consists in breaking up the vault of the skull and removing the bone; afterwards inducing a face presentation and delivering.

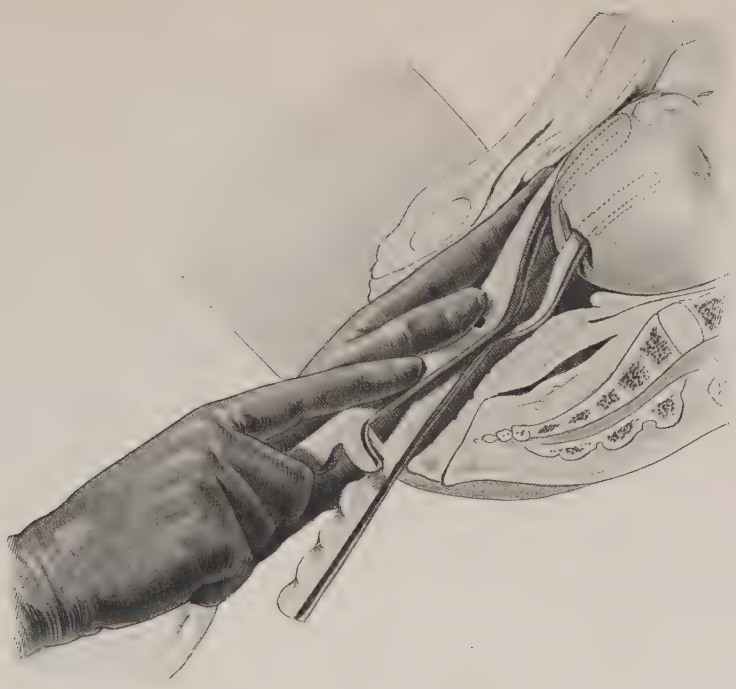


FIG. 211.—Applying the Female Blade over the Scalp.

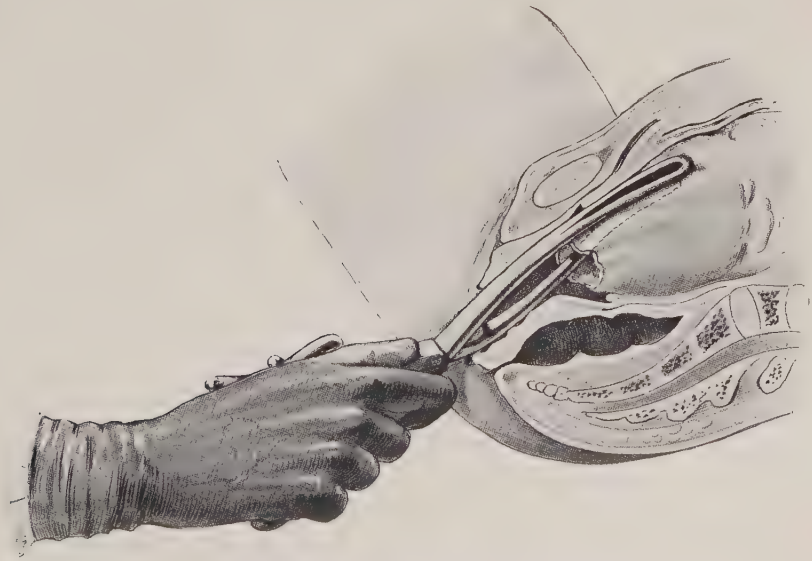


FIG. 212.—Traction applied by the Cranioclast.

1. The left hand is passed into the vagina and the fingers carried to the perforation hole.

2. The right hand then guides the fenestrated blade up to the hole in the scalp, and then on between the scalp and the bone of the skull (Fig. 213).

3. The solid blade is passed through the perforation hole, guided by the right hand, and held in position (Fig. 214).

4. The handles are then screwed up tightly.

5. The cranioclast is next twisted from side to side till the piece of bone that grasps it is loosened (Fig. 215).

6. The instrument is now withdrawn until the piece of detached

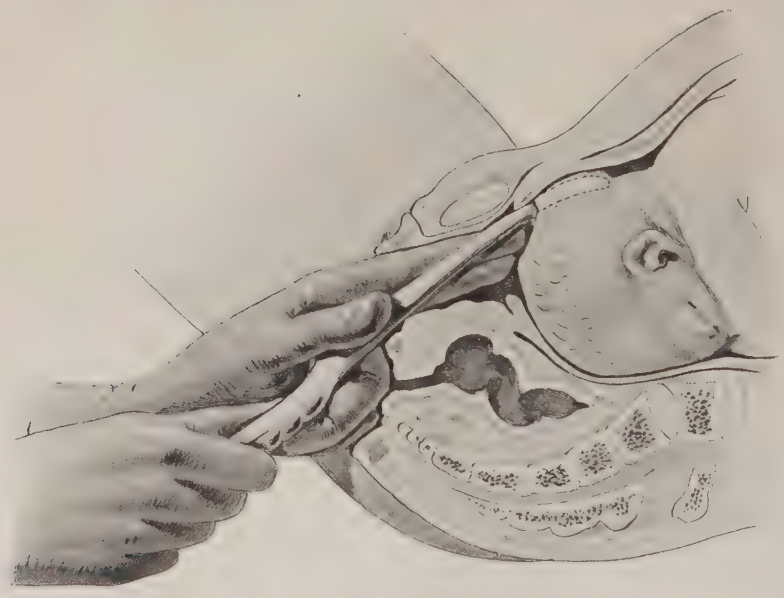


Fig. 213.—Applying the Female Blade inside the Scalp.

bone in its grasp is free of the scalp, after which the end of the instrument and piece of bone are surrounded by the left hand, and all three withdrawn from the genital canal. By this means the danger of wounding the genital canal with the piece of detached bone is avoided (Fig. 216).

7. This manœuvre is repeated till as much as possible of the vault has been removed.

8. The operator now brings the chin forwards and adjusts the mutilated skull till the face presents (Fig. 217, 218).

9. A crotchet may then be fixed in the mouth, orbit, or base of the skull and the child extracted (Fig. 219), or the cranioclast

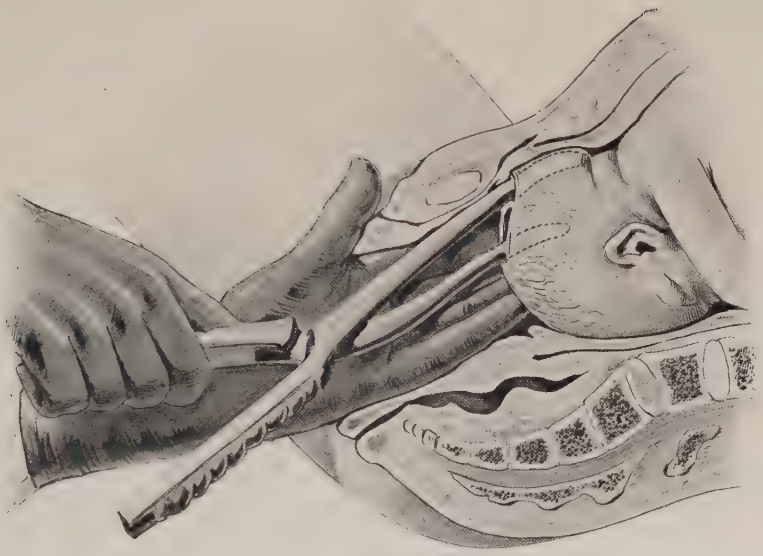


FIG. 214.—Inserting the Male Blade.

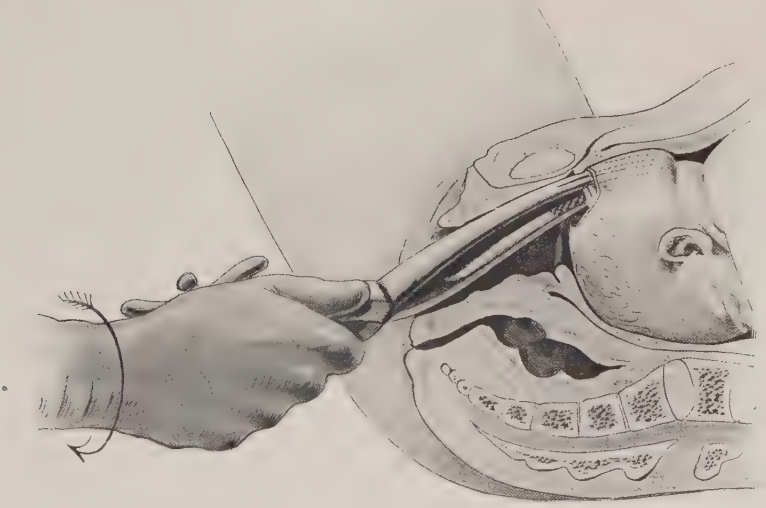


FIG. 215.—Loosening the Bone.

may be put to its third use, that of a crusher, especially if the pelvis is very contracted.

10. In this case it is better to first fix the skull with the

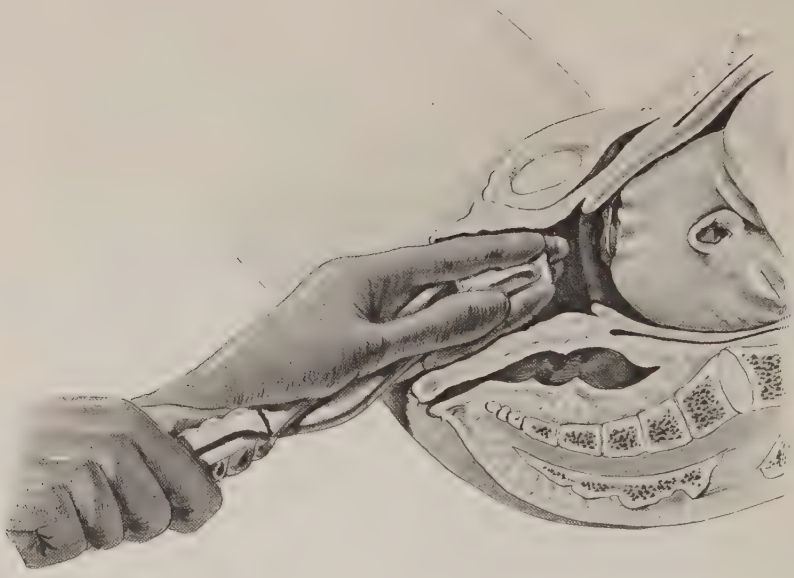


FIG. 216.—Removal of the Bone.

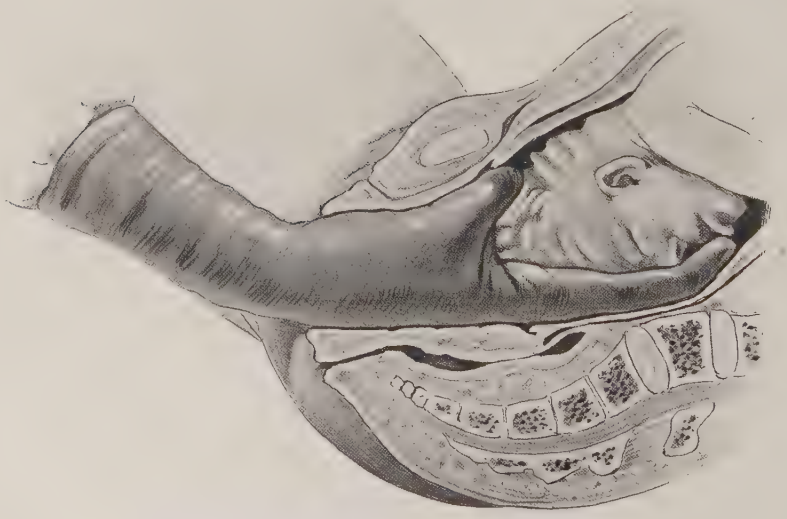


FIG. 217.—Passing the Finger up to the Mouth.

FIG. 218.—Inducing Face Presentation.

FIG. 219.—Extraction with the Crotchet.

crotchet, after which the fenestrated blade is passed under the chin and the solid blade over the base of the skull; both blades are then approximated as closely as possible by means of the screw, and the face is crushed. A tighter grip is thus obtained; that part of the skull engaging in the conjugate is reduced to its minimum, and with steady traction the child is delivered (Fig. 220).

Dangers.—Sepsis from the introduction of micro-organisms and

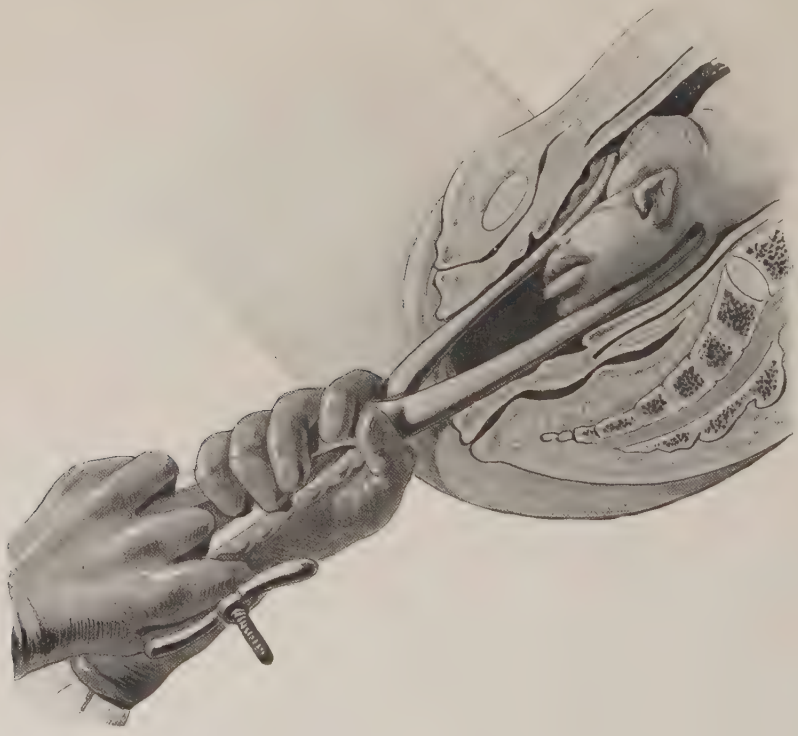


FIG. 220.—Crushing the Face with the Cranioclast.

laceration of the soft parts from the sharp edges of the pieces of bone removed during the operation of cranioclasm.

Cephalotribe.—The cephalotribe acts as a crusher and a tractor.

1. The left hand is passed into the vagina and the fingers inserted between the head of the child and the cervix.

2. The blades are introduced by the right and left hands respectively (Figs. 221, 222). The handles are then locked and the screw tightened *till the ends of the blades meet* (Fig. 223). To ascertain when this has occurred the operator should have made a note as to the distance between the ends of the handles

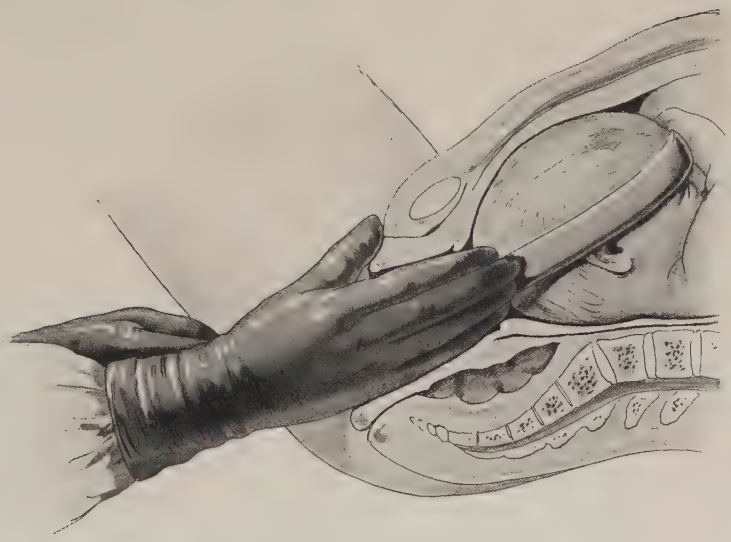


FIG. 221. —Applying the Left Blade of the Cephalotribe.

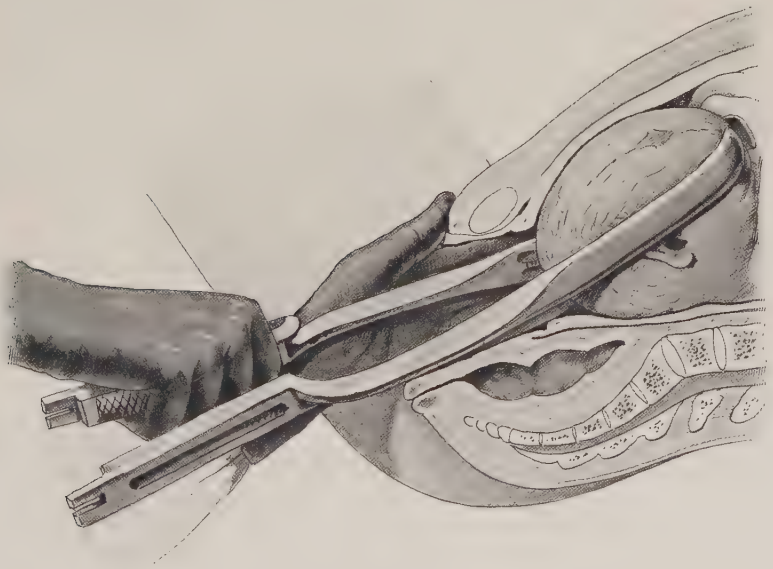


FIG. 222.—Applying the Right Blade.

when the tips of the blades are in apposition before the instrument is applied.

3. The method of extraction will now depend upon whether the

pelvis is generally contracted or flattened, and further, in the latter case, whether the head has entered the pelvic cavity or is arrested above the brim.

4. When the pelvis is generally contracted or the head is arrested in the cavity of a flattened pelvis, the child is delivered by traction only.

5. If, however, the head is arrested above the brim in a flattened pelvis, then the cephalotribe must be rotated a quarter of a circle before the crushed head is pulled through the brim (Figs. 224, 225). By this manœuvre the longest diameter of the crushed head, which

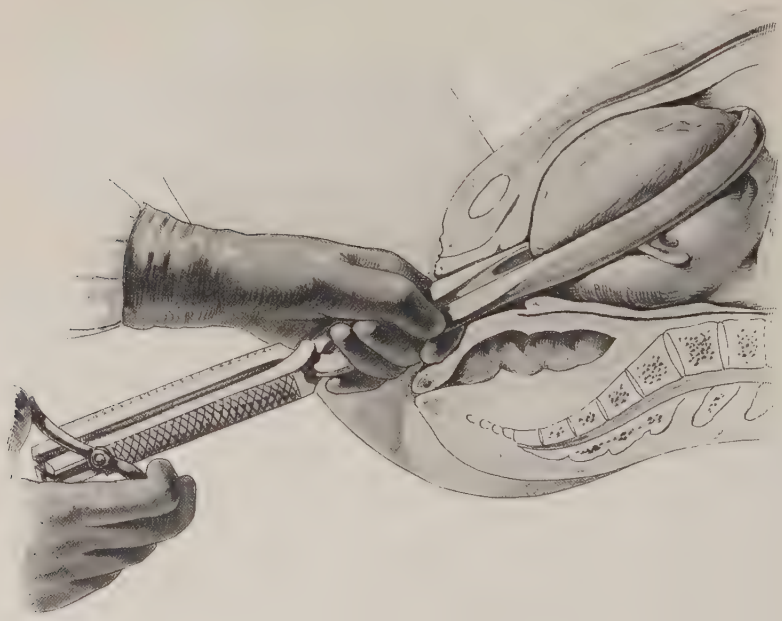


Fig. 223.—Crushing the Head.

was before parallel to the true conjugate, is brought into the transverse diameter of the inlet of the pelvis, where there is more room, and the smallest diameter of the head brought into the smallest diameter of the brim. Traction is now applied, and as the head is being delivered the operator rotates the skull backwards into the position it originally occupied so as to bring its long diameter into the antero-posterior diameter of the outlet.

Difficulties.—The chief difficulty when using the cephalotribe is to apply the blades over the broadest part of the skull. If this is not done, the blades will tend to slip as the screw approximates them.

The left hand must therefore be passed up to the blades from time

to time to ascertain their position as the screw is being tightened, and if they are slipping either forwards or backwards; according to

FIG. 224.—Rotating the Crushed Head.

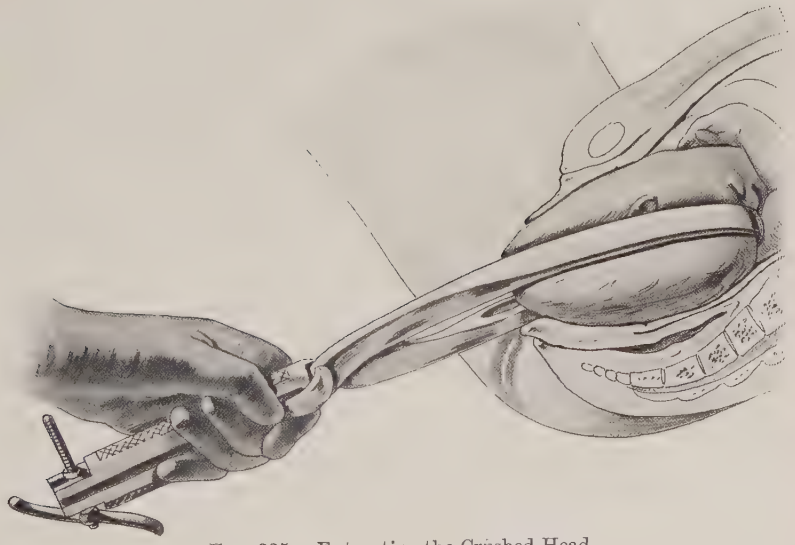


FIG. 225.—Extracting the Crushed Head.

whether they have been applied in front or behind, the greatest diameter of the head, the screw must be loosened and the blades

moved either forwards or backwards, as may be necessary by adjusting the handles.

Dangers.—Apart from the danger of sepsis from the introduction of germs, care must be taken to prevent laceration of the vagina by the sharp edges of the perforated bone. After the crushing is complete, therefore, and before exerting traction, an examination should be made for any sharp pieces of bone, and, if found, they should be removed with a strong pair of crocodile forceps.

Relative Merits of the Cephalotribe and Cranioclast.—By means of the cranioclast as used in the operation of cranioclasm, a head can be pulled through a smaller conjugate than with a cephalotribe. Thus by inducing a face and using the cranioclast to crush its vertical diameter, that diameter of the skull engaging in the conjugate can be brought as low as $1\frac{1}{2}$ inches, whilst with the cephalotribe the lowest diameter that can be obtained is 2 inches. Again, if the pelvis is generally contracted, the cranioclast used as a tractor will effect delivery more easily than a cephalotribe, since in the former case the pelvis itself will reduce the diameter of the skull in all directions, whilst if the cephalotribe is used, the instrument, whilst diminishing the head in one diameter, tends to increase it in the opposite. Whilst, therefore, by rotating the cephalotribe this alteration in shape can be used to advantage in cases of flat pelvis, in cases of generally contracted pelvis this instrument is not the best one to use.

The operation of cranioclasm is a difficult operation, and takes a longer time to perform than cephalotripsy. In England, cases of extreme pelvic contraction are rare, and the chances of such escaping notice before labour sets in are fewer than they used to be.

The results from Cæsarean section are so much improved that this operation has largely taken the place of craniotomy, especially when the contraction is marked. It, therefore, matters little which instrument a medical man purchases before starting practice. He will be wise to stick to one instrument. The increased dexterity obtained by practice with one instrument more than counterbalances any advantage there may be in having the choice of two.

A special variety of cephalotribe invented by Auvard is used principally on the Continent. This instrument consists of one solid and two fenestrated blades.

1. The solid blade is first passed through the perforation hole into the cranial cavity, and well up to the base of the skull.

2. One fenestrated blade is now applied over the face, if possible, an assistant steadying the head externally.

3. The blades are approximated by turning the screw until the

fenestrated blade catches in the slot in the shoulder of the instrument. Care must be taken to ensure that a good grasp is obtained, and the front part of the head is crushed.

4. The second fenestrated blade is then passed over the occiput, locked, and the back part of the head is crushed by turning the screw until the fenestrated blade catches in the other slot in the shoulder of the instrument.

5. The crushed head is then delivered by traction, the operator rotating the head or not, as may be necessary, after the manner described in the operation of cephalotripsy.

This instrument has met with a certain amount of adverse criticism from some English authorities, most of it of a theoretical nature, emanating, as it does, from those who have apparently never used the instrument.

It is an instrument somewhat more difficult to apply than the cephalotribe or cranioclast, and its particular merits are rather limited to those cases where the pelvic deformity is marked; but in these it materially shortens the time occupied in delivery.

Forceps, Crotchet, and Vertebral Hook.—Delivery of the perforated head by forceps is not to be advised, for the instrument is almost certain to slip as the head collapses. The crotchet and vertebral hook are of historical interest chiefly.

The crotchet is passed into the cranial cavity and its point fixed on some portion of bone; then with the fingers of the left hand on the scalp counter pressure is made. It can also be fixed in the mouth or orbit. It is a dangerous instrument.

The vertebral hook was designed by Oldham to effect traction by passing it down the vertebral canal and hitching it into its bony wall. No practical obstetrician would make use of it nowadays.

Extraction of the Body.

If the pelvic contraction is marked, or the child is larger than normal, much difficulty may be encountered in delivering the body. In this case traction by the cephalotribe may be assisted by using the blunt hook in the axilla, by bringing down the two arms and pulling on these, or by the operation of cleidotomy.

Extraction of the After-coming Head.

Generally in these cases after the head of the child has been perforated, the head can be extracted quite easily by traction on the child's feet. If this is insufficient, the cephalotribe or cranioclast should be applied to the crushed head. In exceptional difficulty the jaw and face should be cut away with strong scissors.

DECAPITATION.

INDICATIONS.

When, with a transverse presentation, version cannot be effected.

When, with a transverse presentation, the uterus is tonically contracted.

When the child is dead, and any difficulty is experienced in turning.

When, on attempting podalic version the leg of the child becomes detached, as it may do if the child has been dead for some time.

In locked twins, when the after-coming head of the first child is impacted by that of the second, or by the shoulder and arm of the second child lying transversely.

In a thoracopagous monster, when the first head is presenting at the vulva, and the second is jammed in the pelvis, the first head should be decapitated.

In a dicephalous monster, when both heads present and labour is obstructed, the first head must be decapitated, and the monster delivered by version.

INSTRUMENT.

The operation is best performed with a Ramsbotham's hook.

Some operators prefer a serrated edge in place of the sharp one, contending that the vertebral column is thereby more easily severed.

The neck can also be severed with a strong pair of scissors.

PREVIOUS PREPARATION.

See remarks under General Considerations.

POSITION OF THE PATIENT.

The patient should be placed in the lithotomy position.

Steps of the Operation.

1. The arm, if not already prolapsed, should, if possible, be brought down, and a piece of tape tied to it, so that a firm grasp may be obtained.

2. The prolapsed arm should be pulled upon firmly so as to get the neck as low as possible. If the arm cannot be brought down a blunt hook must be fixed in the axilla.

3. The left hand is then passed into the vagina and up between the neck and front of the pelvis.

4. The decapitating hook, protected by the palmar surfaces of the left hand and fingers, is then passed up the vagina with the right

hand between it and fœtus until the hook is above the level of the neck.

5. The hook is next turned back at right angles so that it surrounds the upper border of the neck.

6. The index finger of the internal hand having been passed

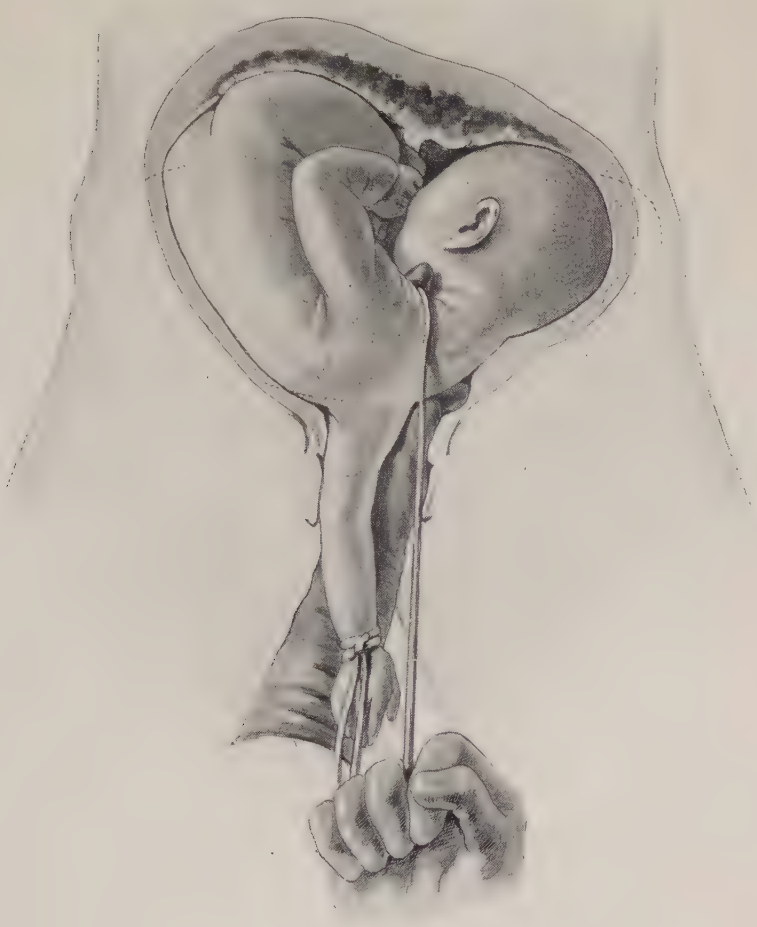


Fig. 226.—Decapitation.

behind the neck to feel the point of the hook and ensure that it is free.

7. The hook is now pulled strongly downwards and at the same time moved from side to side, when the soft tissues of neck and the vertebral column will be easily divided (Fig. 226).

8. The body of the child is then extracted by pulling on the prolapsed arm or blunt hook (Fig. 227).

9. The decapitated head is lastly delivered in one of the follow-

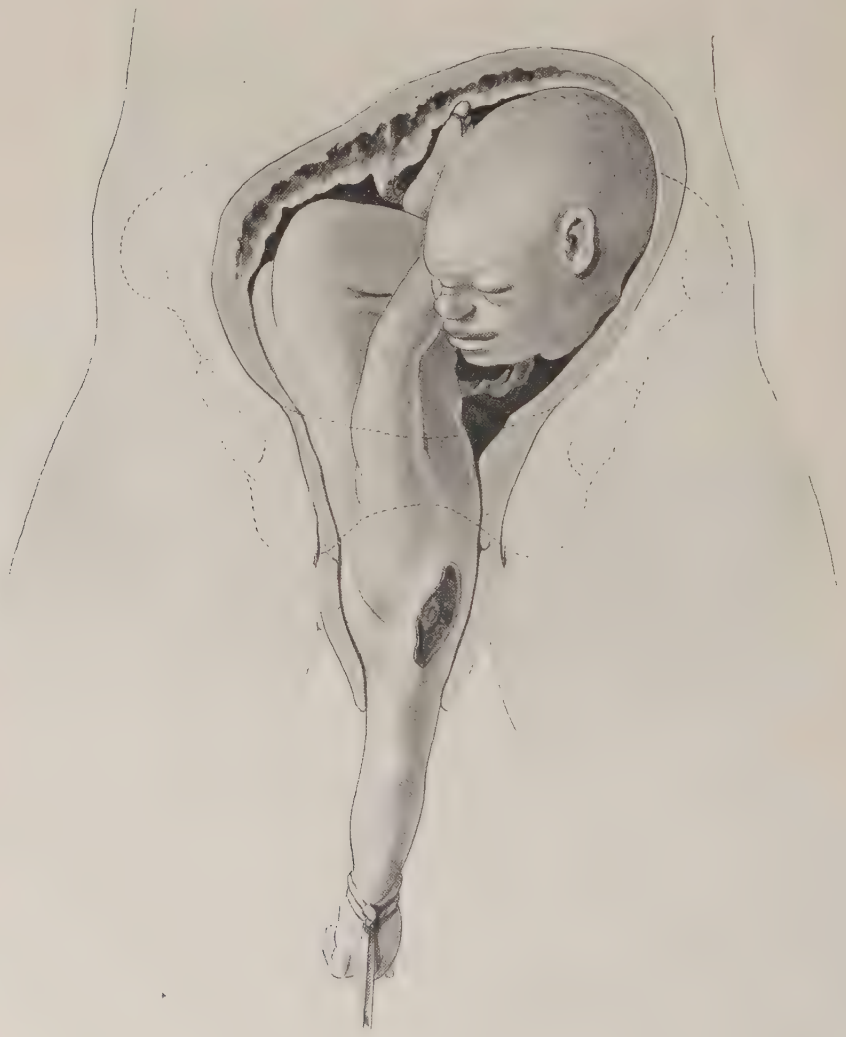


Fig. 227.—Extraction of Trunk after Decapitation.

ing ways: By the natural expulsive forces, by pressure on the fundus, by forceps, by inserting the finger or crotchet in the mouth and delivering the head as a face (Fig. 228), or by perforating the head and then delivering with a cranioclast or cephalotribe.

10. The decapitation of locked twins or double-headed monsters is best carried out with a pair of strong scissors.

DANGERS.

Wounding the Maternal Soft Parts.—The bladder may be injured unless care is taken to apply the hook so that the point

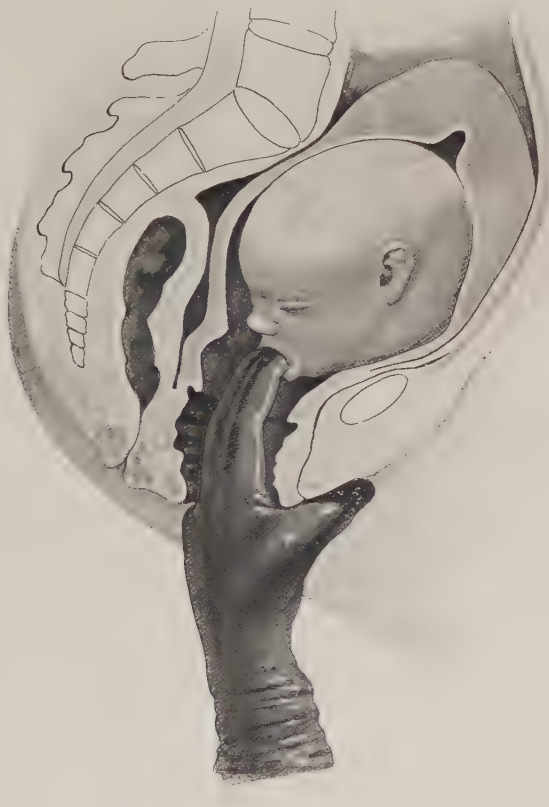


FIG. 228.—Extraction of Decapitated Head by Mouth Traction.

is directed backwards. The soft parts of the mother may be wounded by the sharp edges of the cut vertebræ when the head or body is being extracted, or by the hook slipping as the last part of the neck is severed. If the index finger of the internal hand is kept on the point of the hook there will be no danger of it slipping.

The uterus may be ruptured through carelessness, or because its lower segment is so stretched that the necessary manipulations cause it to tear.

Sepsis.—Great care must be taken to prevent sepsis by the use of indiarubber gloves and other methods already indicated. After delivery the uterus should be washed out with a hot douche of 1 in 4,000 biniodide of mercury.

DIFFICULTIES.

Contracted Pelvis.—The head may be so high up that the neck cannot be reached. This may occur if the pelvis is contracted, when evisceration will have to be performed, perhaps followed by spondylotomy; or if spontaneous evolution has commenced, in which case it should be assisted by traction on the breech by the fingers or blunt hook, hooked over the groin.

Bad Direction of Cut.—Care must be taken by keeping the finger on the point of the hook to ensure that it is cutting through the neck and not in a slanting direction through the thorax.

EVISCERATION.

This operation consists in removing the viscera from the thorax and abdomen of the child to allow of its delivery.

INDICATIONS.

1. **Impacted-shoulder Presentation.**—It is sometimes impossible to decapitate the child when its shoulder is impacted owing to the neck being too high up, and this is more especially likely to happen when the mother's pelvis is contracted.

2. **Distended Abdomen or Thorax of the Child.**—The thorax or abdomen of the child may be distended with fluid (hydrothorax ascites) and the abdomen with tumours of the kidneys, ovaries, spleen, or liver.

PREVIOUS PREPARATION.

Considerations as for decapitation.

Steps of the Operation.

Impacted-shoulder Presentation.—1. The body of the child is steadied by an assistant pulling on the prolapsed arm.

2. The operator next passes his left hand up to the thorax

or abdomen, as the case may be, and then with his right hand carries up a perforator or pair of sharp-pointed scissors along

Fig. 229.—Opening the Trunk.

the flat of his left hand and with it opens the thorax or abdomen (Fig. 229).

3. The viscera are next removed (Fig. 230).
4. The child is then delivered either by passing the fingers over

the groin and pulling on the breech, or with the crotchet or cranioclast fixed in the thorax or abdomen.

5. The uterus is washed out with 1 in 4,000 biniodide of mercury,

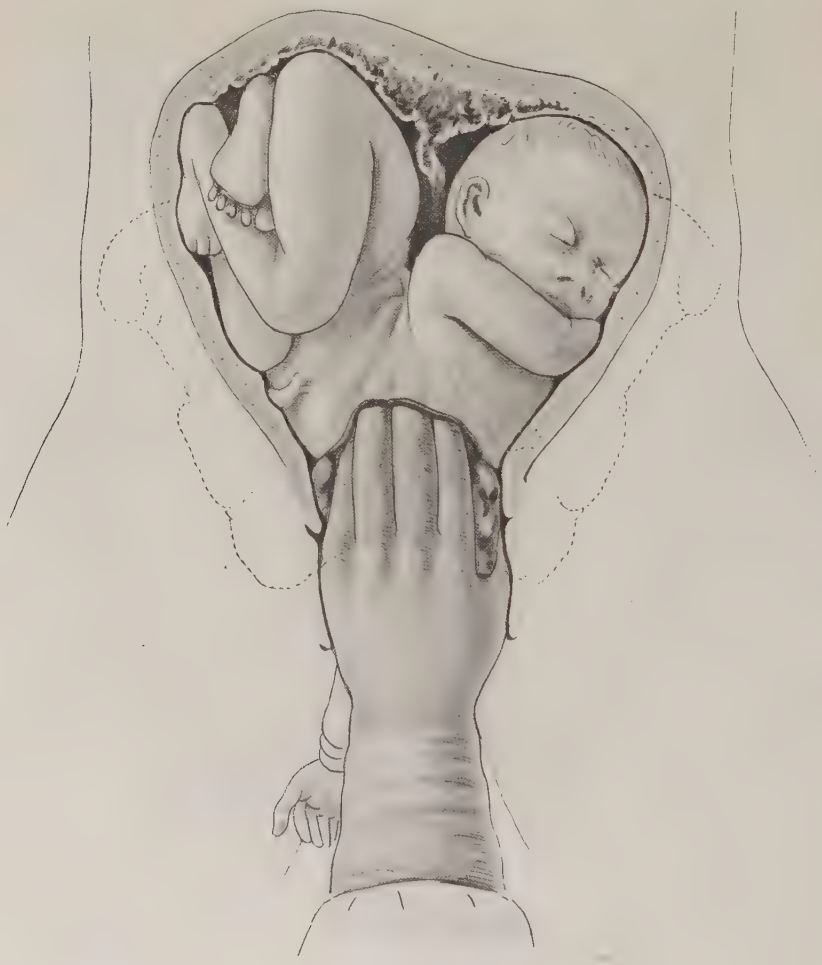


FIG. 230.—Removing the Viscera.

DIFFICULTIES.

Even after evisceration it may be impossible to deliver the doubled-up body of the child, in which case the operation of spondylotomy, that is, bisecting the vertebral column, must be performed.

SPONDYLOTOMY.

1. The spine is divided where it most projects with strong scissors, and subsequently the whole trunk is cut through.

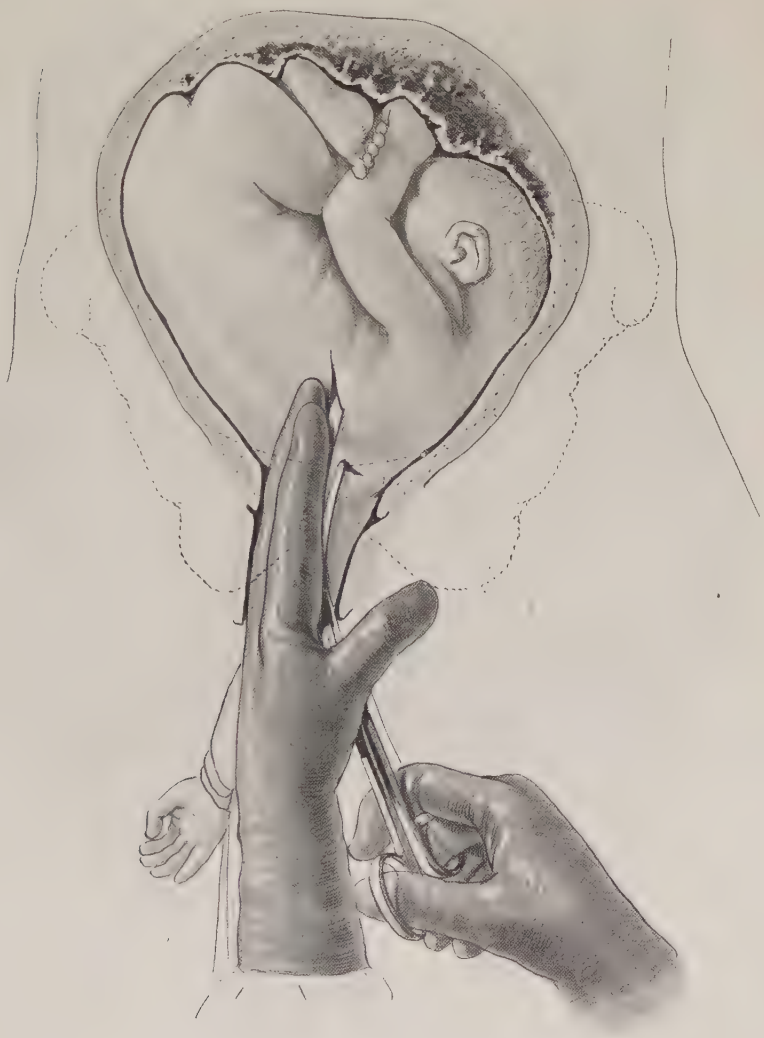


FIG. 231.—Dividing the Vertebral Column.

2. After division of the trunk, the upper half is first delivered by traction on the arm (Fig. 232), then the lower half by traction on the leg (Fig. 233). If delivery cannot be effected in this

way, the cephalotribe or cranioclast must be applied to each half.

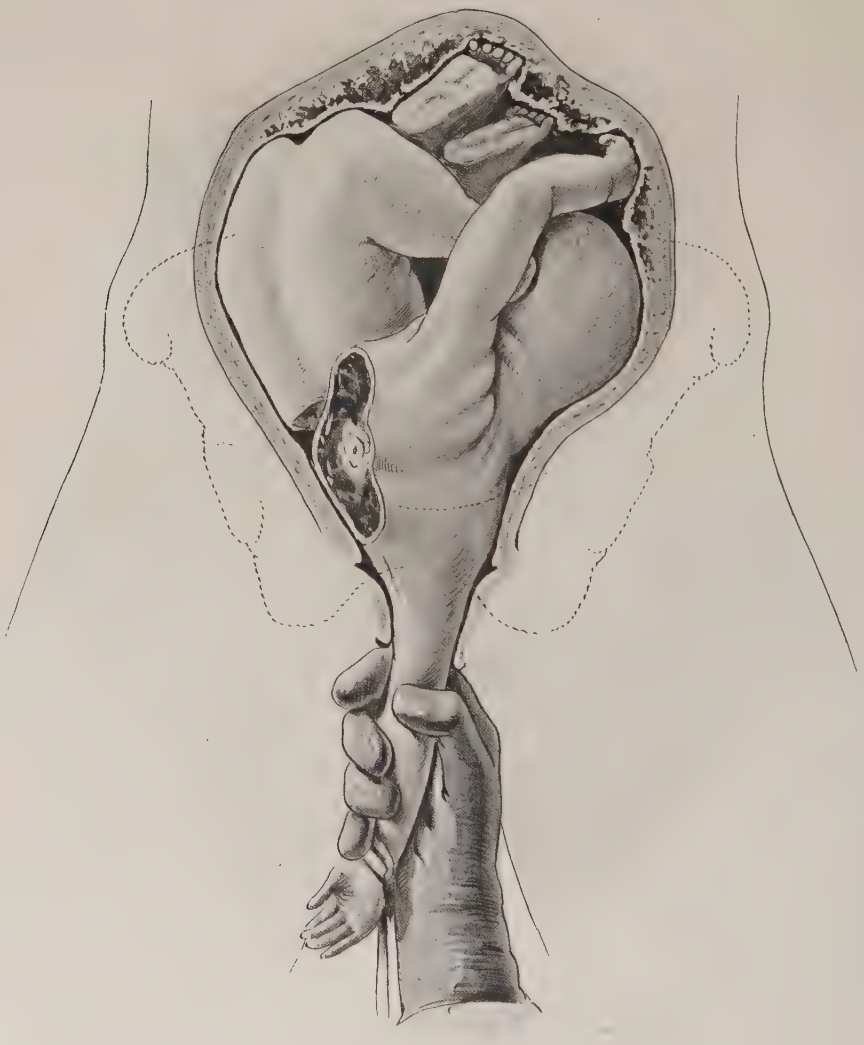


FIG. 232.—Extracting the Upper Part of the Trunk.

DANGERS.

The soft parts of the mother may be injured during the operation of evisceration and spondylotomy, and septic organisms may be introduced.

CLEIDOTOMY.

Division of the clavicle may be required when the shoulders of the child cause obstruction. This most often occurs with anencephalic and double-headed monsters.

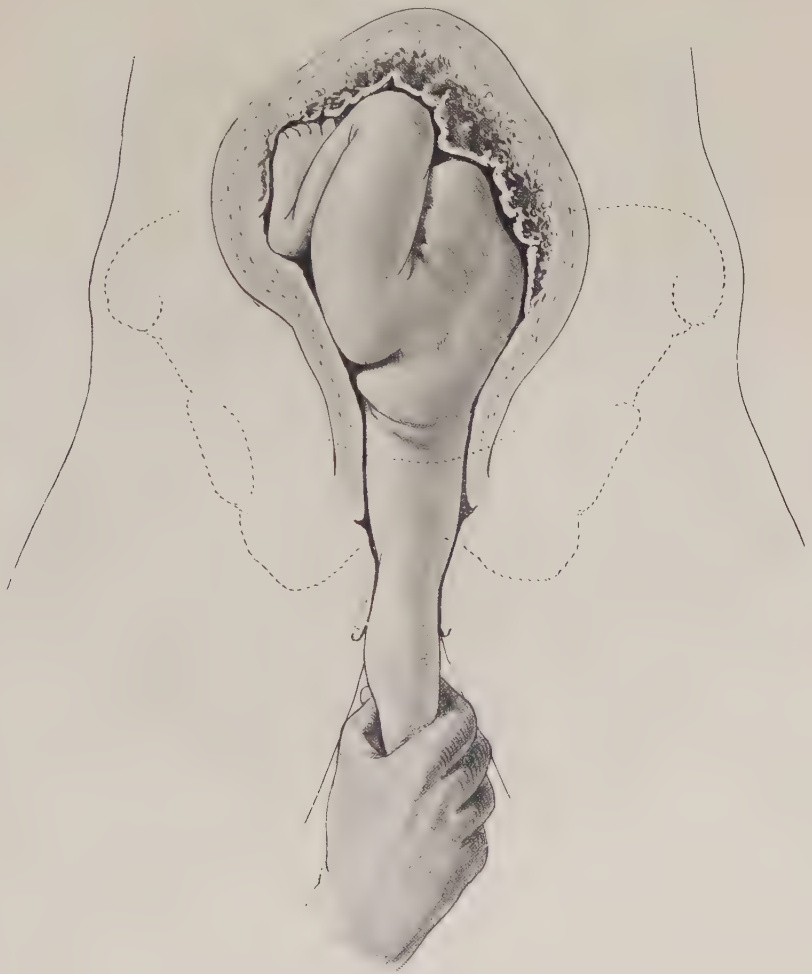


Fig. 233.—Extracting the Lower Part of the Trunk.

If the head is in the way it should first be removed by dividing the neck with scissors.

The position of the clavicles being then defined, one or both are divided with a strong pair of scissors (Fig. 234).

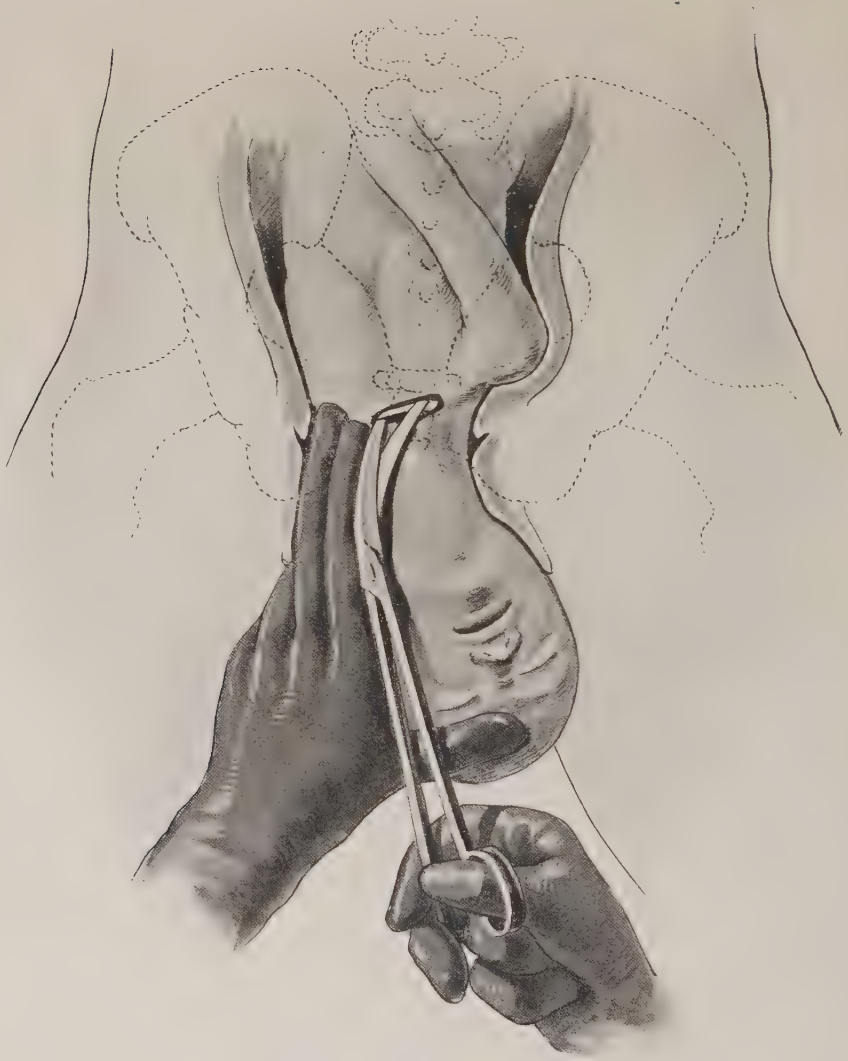


FIG. 234.—Dividing the Clavicle.

The trunk is then extracted either by making traction on the head or by pulling upon a blunt hook fixed in the axilla.

CHAPTER XXXI.

Obstetric Operations (*continued*).

DIVISION OF THE PELVIS.

There are two methods of performing division of the pelvis:

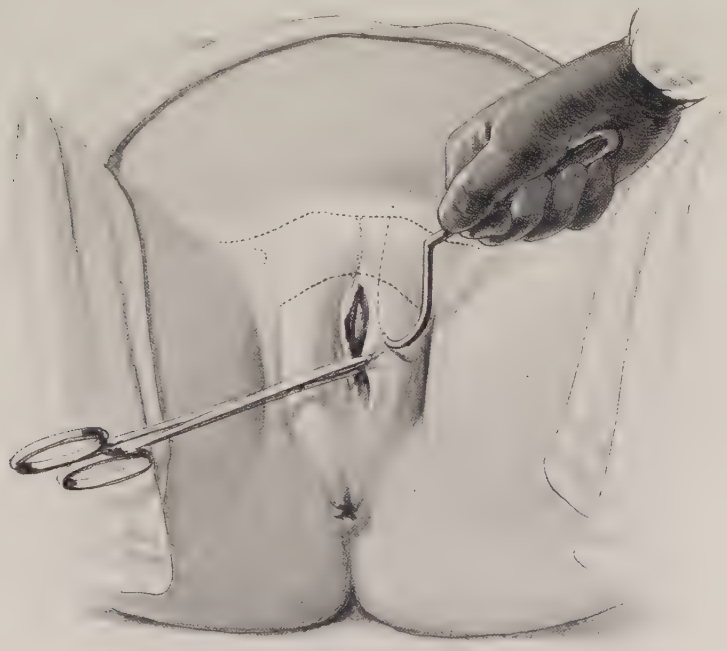


Fig. 235.—Pubiotomy. Point of Insertion of the Needle.

(1) By incising the symphysial joint; and (2) by sawing through the bone to one side of the joint.

INDICATIONS.

Division of the pelvis may be employed for labour obstructed either by pelvic contraction or by malpresentation of the head.

The indications and contra-indications for division of the pelvis in cases of contracted pelvis will be found discussed on pp. 399 and 412, and need not therefore be repeated here.

As regards obstruction due to malpresentation, we are of opinion that the operation is very rarely indicated.

In certain cases of unrectifiable occipito-posterior or face presentation in which forceps traction has failed, and the child is still alive and vigorous, symphysiotomy or pubiotomy might be employed

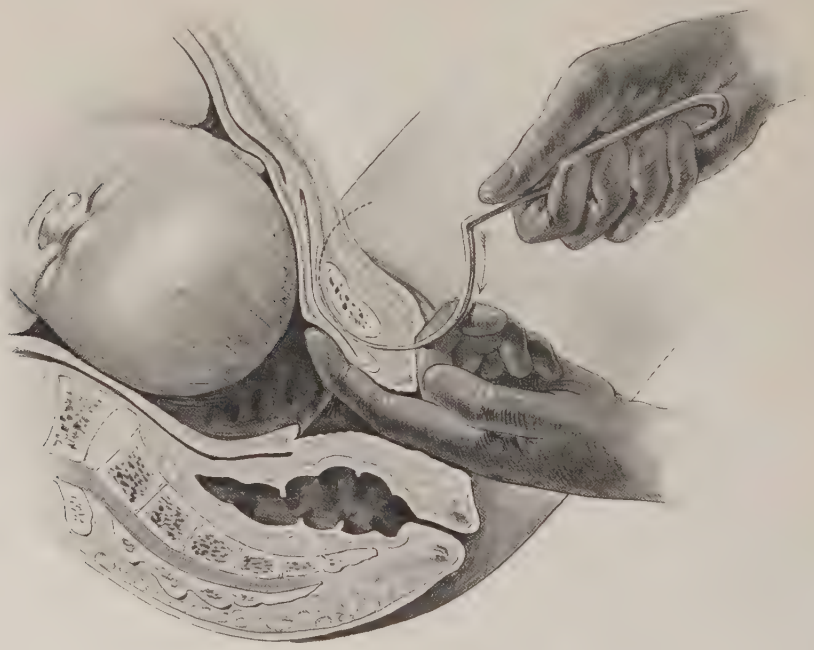


Fig. 236.—Pubiotomy. Passing the Needle.

provided the patient and her husband were willing to accept the risks involved in the interests of the child.

Symphysiotomy has the advantage over pubiotomy that it can be performed without any special instruments; but, on the other hand, it involves more risk of wounding the urethra and bladder, and a greater liability to lax union afterwards. Pubiotomy further has this in its favour, that a degree of permanent enlargement of the pelvis is secured which may permit subsequent labours to be consummated without assistance.

Of the two operations we think best of pubiotomy, which we shall therefore first proceed to describe.

Pubiotomy.

Preparation of the Surgeon.—The surgeon should prepare himself and his assistants with the same care as for any other operation. Rubber gloves must, of course, be worn.

Preparation of the Patient.—The patient should be placed in the lithotomy position. If the forceps have previously been applied

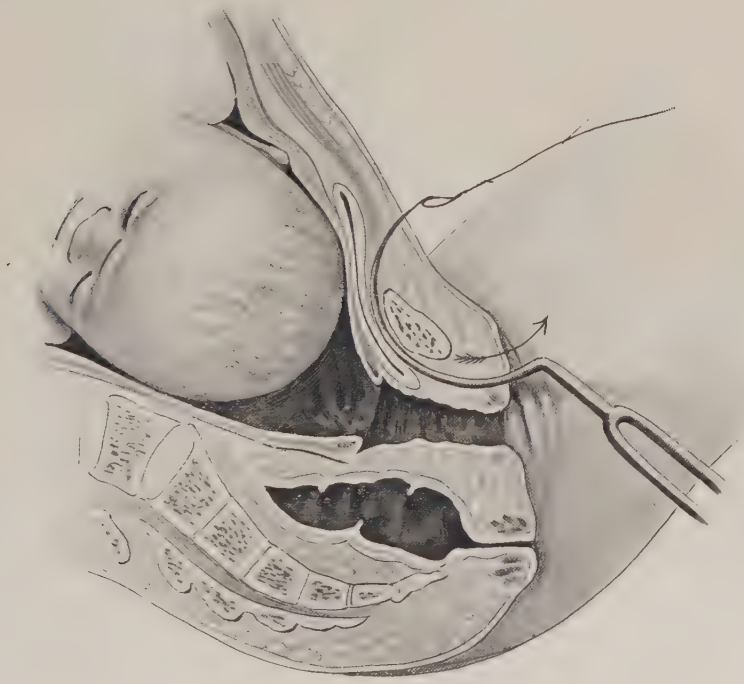


FIG. 237.—Pubiotomy. Drawing the Saw into Position.

they need not be taken off, as they will be required after the division of the bone.

The pubic hair should be dry shaved, the skin painted with a 2 per cent. solution of iodine in spirit, and the vulva very carefully swabbed with antiseptic solution.

Steps of the Operation.—Bumm's Subcutaneous Method.—The left labium majus being pulled to the right by an assistant, Bumm's pubiotomy needle is pushed through the skin to the outer side of it just below the edge of the descending ramus of the pubic bone (Fig. 235). The point having reached that edge, it is manipulated up behind the body of the pubic bone and in front of the

bladder until it emerges through the skin about three-quarters of an inch to the left of the middle line, just inside the pubic spine (Fig. 236). A Gigli's saw is now attached to the needle, which is withdrawn, leaving the saw in position (Fig. 237).

The bone is now divided by an up-and-down movement of the saw, taking care to avoid lacerating the soft tissues (Fig. 238).

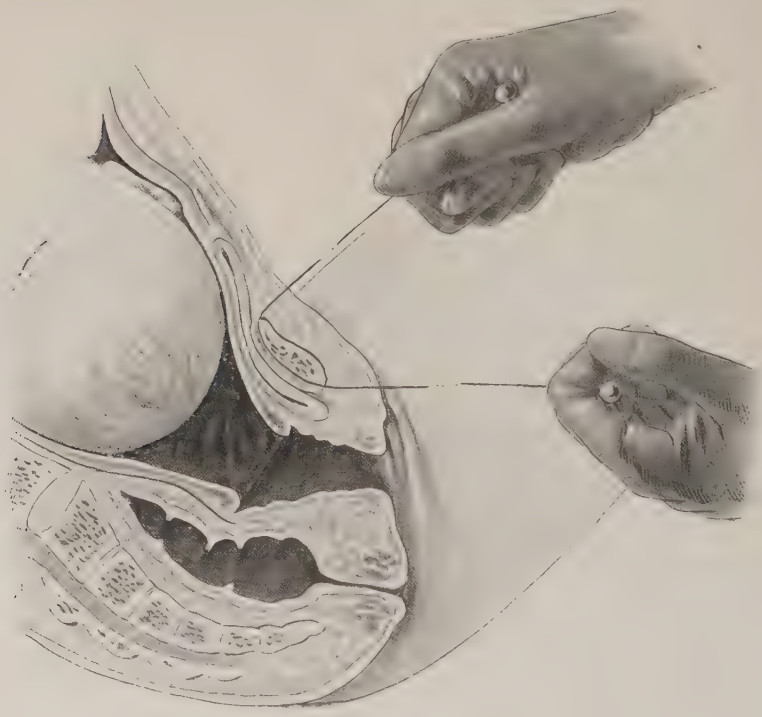


Fig. 238.—Pubiotomy. Dividing the Bone.

This leads to an enlargement of the pelvis, as shown in Figs. 239 and 240.

To prevent undue separation of the bone ends the pelvis should be steadied by an assistant on either side.

The bone being divided, the head should be extracted with forceps unless the cervix is insufficiently dilated, in which case the patient must be allowed to recover from the anæsthetic and time given for this event to take place. It is, however, rarely advisable to perform the operation at all under these circumstances.

Dressing and After-treatment.—A simple dressing over the puncture holes is required, and the pelvis should then be firmly bound with a strong belt placed over the obstetric binder.

Tweedy advises that in twelve hours the patient should be turned from side to side, and on the third day she may move herself.

When requiring to defæcate she should be lifted on to the bed-pan by means of the belt.

Difficulties and Dangers.—The operation by the subcutaneous method is an easy one provided the practitioner possesses the necessary instruments. Difficulty sometimes is experienced in guiding the needle behind the bone.

The principal danger of pubiotomy is wounding one of the large veins that lie in front of the bladder. In this event a hæmatoma rapidly forms, and appears under the vaginal mucosa, in which

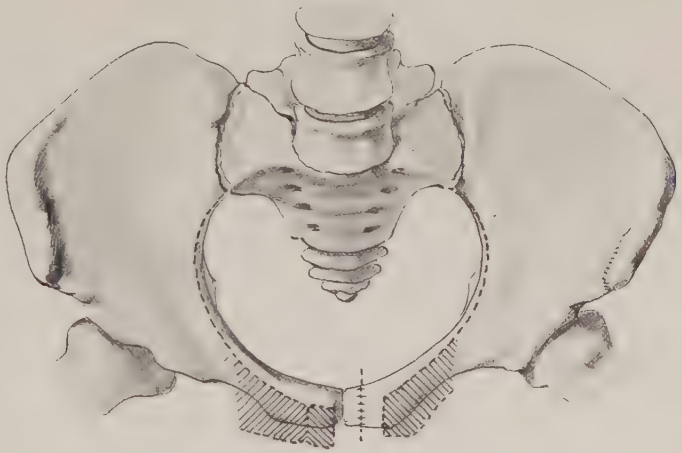


Fig. 239.—Pelvic Enlargements produced by Pubiotomy.

case digital compression of the tissue between the bone-ends applied for some minutes will control and check it.

If care is not taken during the extraction of the head the vaginal wall, the urethra or even the bladder may be torn. The wound thus caused communicates with the space between the bone-ends and suppuration is not unlikely.

Doderlein's Open Method.—The skin is incised just above the pubes, about three-quarters of an inch to the left of the middle line. Through this incision the index finger is inserted and insinuated down between the bladder and the bone. A path having been made, a Doderlein's pubiotomy needle is passed along it and made to emerge on the outer side of the labium majus below the edge of the ramus. The saw is then attached, drawn into position, and the bone divided as in Bumm's method. The dangers are the same.

Of the two proceedings, Bumm's would appear to be the best. In the case of either it has been stated by some authorities that there is less risk of laceration of the soft parts if the patient be left to deliver herself after the bone has been divided. This entails much further suffering, and we are not disposed to practise

Fig. 240.—Pubiotomy. Pelvis divided. The Head coming down past the severed Bone.

it unless, as previously stated, the cervix requires further dilatation.

Symphysiotomy.

There are two ways of performing this operation; (1) The subcutaneous method, and (2) the open method. The first is the better.

Preparation of the Surgeon and Patient.—As for pubiotomy.

Position of the Patient.—As for pubiotomy.

Steps of the Operation.

The Subcutaneous Operation.—The operator makes a stab incision in the middle line immediately over the symphysis with a sharp scalpel. Through this a stout, blunt-pointed bistoury is introduced, and the joint is incised from above downwards until

the subpubic ligament is reached (Fig. 241). This is cautiously divided to avoid injury to the urethra.

The process of the bistoury through the joint should be checked by a finger in the vagina.

The symphysis being divided, the head should be extracted with forceps, unless time is required for the cervix to complete dilatation.

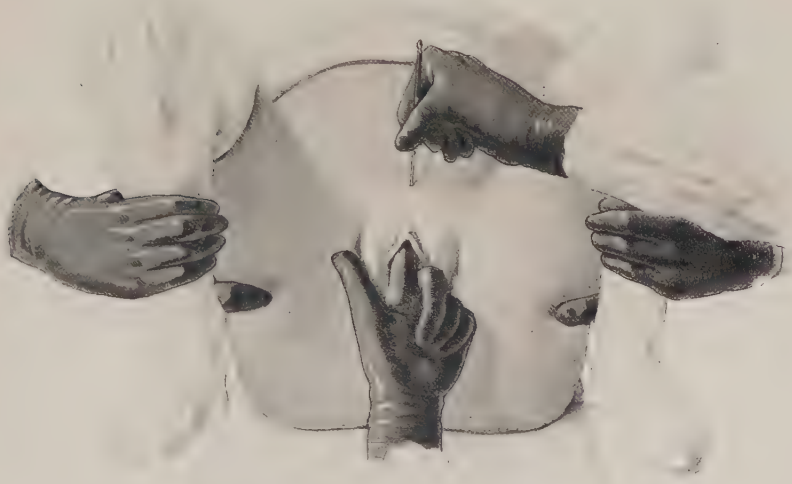


Fig. 241.—Symphysiotomy by the Subcutaneous Method.

Too great separation of the bones is prevented by an assistant steadying the pelvis on either side.

Difficulties and Dangers.—The operation is an easy one in most cases.

There may be difficulty in hitting the exact line of the symphyseal joint. Exceptionally this joint may be more or less ossified.

The risks to the urethra and bladder are greater than in pubiotomy. Hæmorrhage may occur in the same way.

The Open Operation.—The following instruments will be required: Scalpel, scissors, dissecting forceps, pressure forceps, needles, sutures, bladder sound, and, if available, Galbiati's knife and Pinard's registering separator.

A median incision is made across the front of the symphysis pubis a little to one side of the clitoris, about 3 inches long. The recti and pyramidales muscles are then identified, the operator

pushes the index finger of his left hand between them and behind the symphysis, thus protecting the bladder from injury during the operation.

The operator having located the symphysis pubis, divides it from above downwards with a Galbiati knife or stout scapel held with the right hand; a sound having been previously passed into the bladder is useful to deflect the urethra to one side and to prevent its being wounded.

When the symphysis has been divided the bones spring apart, and the exact amount of their separation may be registered by Pinard's instrument fixed on the pubic bones. This should not exceed $2\frac{1}{2}$ inches.

An assistant on each side supports the legs and prevents too much separation.

If nature does not at once proceed to expel the child, forceps should be carefully used, unless the cervix requires time for dilatation.

The wound is then sutured, special care being taken to unite the connective tissue in the neighbourhood of the bones, silkworm gut being very suitable for this purpose.

Dangers and Difficulties.

Those of the subcutaneous method. Too wide a separation of the bones may result in damage to the sacro-iliac joint.

ABDOMINAL DELIVERY.

There are four methods by which the child may be delivered through an abdominal incision:

1. Trans-peritoneal Cæsarean section.
2. Extra-peritoneal Cæsarean section.
3. Cæsarean hysterectomy.
4. Hysterectomy of the pregnant uterus.

Cæsarean Section.

Cæsarean section is indicated under various circumstances. Certain of these render the indication absolute, namely, when there is no other method by which the child can be delivered. The others constitute a group in which there is legitimate choice between Cæsarean section and some other operation. In these cases the indication is relative.

ABSOLUTE INDICATIONS.

Contracted Pelvis.—Flat pelves with a true conjugate diameter of less than $2\frac{1}{4}$ inches form an absolute indication for Cæsarean section, see p. 405.

General contraction of the pelvis in its more extreme degrees is likewise an absolute indication, see p. 413. In this group also may be included cases in which the pelvic cavity is encroached upon by tumours projecting from the bony wall to such a degree that delivery by craniotomy is undesirable or impossible.

Obstruction by the Soft Parts.—Certain conditions of the pelvic soft parts render Cæsarean section imperative—such as advanced carcinoma of the cervix, vagina or rectum, or stenosis or atresia of the vagina.

Under this head may also be included cases of bilateral anchylosis of the hip-joints, in such a position as to prevent delivery by the natural passage, see p. 409.

Pelvic Tumours.—In obstruction due to ovarian cysts or uterine myomata, Cæsarean section may be the only possible method of delivery, see Chapter XIV.

Rupture of the Uterus.—Cases of rupture of the uterus during pregnancy must be treated by abdominal delivery. Similarly, in rupture of the uterus during labour in which the child has escaped into the peritoneal cavity, abdominal delivery is the only possible course.

Misplacement of the Uterus.—As a result of the operation of ventrofixation the cervix may be so displaced that Cæsarean section is the only means of delivery.

RELATIVE INDICATIONS.

Contracted Pelvis.—Flat pelves with a true conjugate between $2\frac{1}{4}$ and $3\frac{1}{4}$ inches constitute a relative indication for Cæsarean section, the choice here lying between that operation and destruction of the child, see p. 402.

With flat pelves having a true conjugate of $3\frac{1}{4}$ inches or over, and in general contraction of moderate degree, several methods of delivery are legitimate, of which Cæsarean section is one, see pp. 397 and 413.

Obstruction by the Soft Parts.—In some cases of obstructed labour due to conditions of the soft parts, delivery after perforation of the head is possible.

In such the question as to which of the two procedures is the better in the interests of the patient has to be considered.

Pelvic Tumours.—In some of these cases alternatives to Cæsarean section are pushing the tumour out of the way of the presenting part, tapping it if it be cystic, or even delivering it through the vagina in front of the child. These proceedings are discussed in Chapter XIV.

Rupture of the Uterus.—In some cases of rupture of the uterus during labour, namely, those in which the child has not escaped through the rent, delivery may be preferable by craniotomy instead of Cæsarean section.

Eclampsia.—In certain cases of eclampsia in which the fits are of great severity and the cervix very rigid, Cæsarean section is the readiest method of delivery. As alternatives the cervix might be dilated by a screw dilator, or vaginal hysterectomy performed.

With the child at full term we are of opinion that the abdominal operation is the best, see pp. 54 to 57.

Accidental Hæmorrhage and Placental Prævia.—The circumstances in which it may be best to perform Cæsarean section for these conditions are considered on pp. 256 and 266.

THE RISKS OF CÆSAREAN SECTION.

The operation of Cæsarean section by the classical trans-peritoneal route is a simple one, and when carried out by one expert in this class of surgery and with proper assistance and appliances presents no difficulties.

The risks involved under these circumstances depend almost entirely on whether the uterus has been infected beforehand.

In this connection the cases may be divided into three groups:

1. "Clean" cases.
2. "Suspect" cases.
3. Infected cases.

"Clean" Cases.—The cavity of the normal pregnant uterus is sterile, and remains so certainly until the membranes rupture. After this event a direct communication with the bacteria-containing vagina is established along which organisms may obtain entrance into the uterus. Such entrance is usually brought about by the passage of hands or instruments through the cervix and not by ascending growth or migration, for we have shown that even in the puerperium the uterine cavity is normally sterile, see p. 476.

In exceptional cases it is possible for the amniotic sac to be autogenously infected before rupture, notably in the case of a dead child long retained.

Putting aside this unlikely occurrence, it may be accepted that when Cæsarean section is performed before the membranes rupture the operation is carried out in a sterile uterus.

This is very important, because fatalities after the operation are almost invariably due to septic infection of the organ and peritonitis.

Thus the "time of election" for the operation is rather before labour has begun, or while it is still in the first stage with the membranes unruptured.

Cases, however, in which the membranes have already ruptured may also be considered "clean," provided that

Nothing has been passed into the uterus, and

The membranes have not been ruptured for many hours.

Because the chief cause of disaster is absent, the mortality of the operation in this class of case is comparatively low. Amand Routh from 1,282 collected cases estimates it at about 2·9 per cent.

"Suspect" and Infected Cases.—Every case in which the membranes have ruptured is in a sense "suspect," although, as we have stated, where the rupture has been recent and where nothing has been passed through the cervix, the uterus may for practical purposes be considered sterile.

In all others the possibility of bacterial infection of the uterine cavity is more or less present.

In estimating the probability the circumstances of the labour, the degree of manipulation that has been employed, and the care with which it has been carried out must be taken into consideration. The passage of instruments into the uterus and still more the hand makes infection a certainty, see p. 481, but not necessarily is the organism thus conveyed of high pathogenicity.

Bruising of the maternal tissues, as evidenced by œdema, tenderness and excoriation, not only gives reason to fear immediate conveyed infection, but renders subsequent autogenous infection likely, see p. 484. Proof of infection by pathogenic organisms is difficult in suspect cases. Routh has suggested the examination of smear preparations of the liquor amnii.

The mortality of the classical Cæsarean operation in suspect cases is much greater than in clean cases. Routh states the mortality of those in which the membranes have ruptured beforehand as high as 17 per cent.

Undoubted grave infection may be unhesitatingly assumed in cases in which the patient exhibits fever, foul discharge, or an inflamed or sloughing condition of the soft parts.

These are neglected cases, and the child is invariably dead.

Classical Cæsarean section is entirely contra-indicated in such. Instead, Cæsarean hysterectomy or extra-peritoneal Cæsarean section should be chosen if abdominal delivery is necessary.

With signs of definite pathogenic infection, abdominal delivery is absolutely contra-indicated, except in those cases in which no other measure is possible.

As regards suspect cases, each must be treated on its own merits. Under certain circumstances it may be considered justifiable to run an increased risk for the sake of a living child. In general it may be said that if reasonable suspicion of infection is present it is better not to deliver in this way.

Supposing, however, that either by necessity or choice abdominal delivery is decided on, the following devices may be employed to minimise the risk of infection of the operation area.

Intra-amniotic Irrigation.—Maxwell has advised irrigation of the amniotic cavity beforehand with a saline solution or boric acid.

Eventration of the Uterus before Incision.—If the classical operation be decided on, the uterus should be eventrated before it is incised so as to prevent the infected liquor escaping into the peritoneal cavity.

Cæsarean Hysterectomy.—After the removal of the child the uterus can be removed, see p. 673.

Extraperitoneal Cæsarean Section.—To obviate the danger of peritonitis, the approach to the uterus can be made from behind the peritoneum. The details of extra-peritoneal Cæsarean section will be described later on.

Hysterectomy.—Under exceptional circumstances, namely, the child undoubtedly dead, the woman obviously gravely infected, and abdominal delivery the only possible course, it would be proper to perform hysterectomy without first opening the uterus.

Before discussing these alternative operations the technique of the classical trans-peritoneal Cæsarean section will first be described.

TECHNIQUE OF THE OPERATION.

Preparation of the Patient.—Where the operation is carried out deliberately at the time of election, especially before labour has begun, the patient should be prepared in the manner usual before any abdominal operation.

The pubic hair must be shaved, the abdominal skin carefully washed with soap and water, and then sterilised as far as possible by the application of some antiseptic solution. We ourselves use either a 1 in 500 solution of biniodide of mercury in 75 per cent. spirit of 2 per cent. alcoholic solution of iodine. In either case two applications should be made, one some hours beforehand, after which a dry gauze compress should be applied, and one when the patient is on the operating table. In emergency the skin should simply be painted with tincture of iodine.

The bowels should be opened by a dose of castor oil given the day

before the operation, followed by a soap and water enema early on the morning of the operation.

It is most important to catheterise the bladder immediately before the patient is placed on the table.

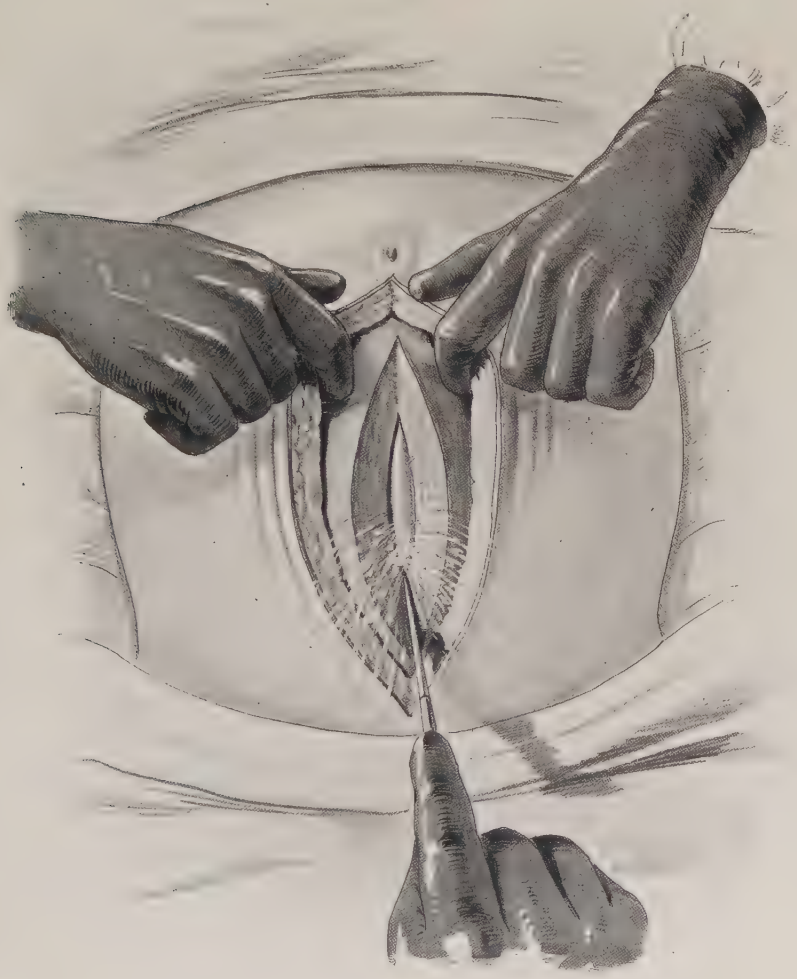


FIG. 242.—Cæsarean Section. Opening the Amniotic Sac.

If possible, antiseptic vaginal douches should have been employed for some days previously.

Position of the Patient.—A slight degree of the Trendelenburg tilt is useful, in that it keeps the bowels from prolapsing through

the abdominal wound. It is not, however, necessary, and the operation can quite well be done with the patient lying on her back.

The Abdominal Incision.—This is in the mid-line, and should

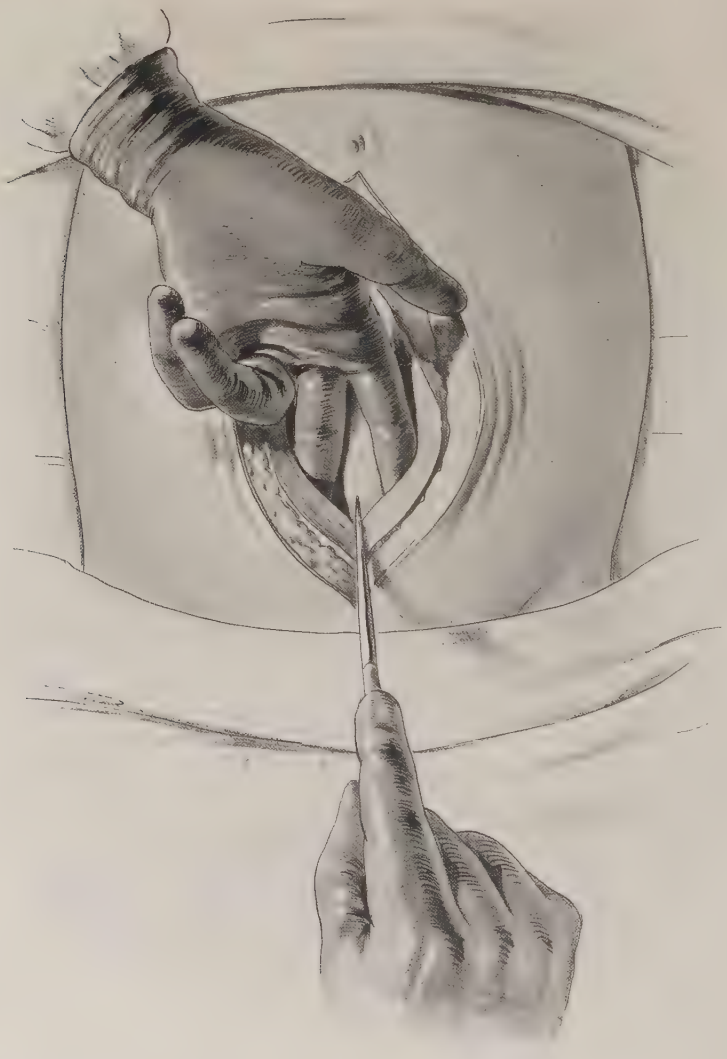


FIG. 243.—Cæsarean Section. Enlarging the Uterine Wound.

nearly reach the umbilicus above. Its length should be from $4\frac{1}{2}$ to 5 inches, according to the thickness of the abdominal wall.

If it be intended to eventrate the uterus before opening it, the

incision must be extended above the umbilicus to the requisite length.

Care must be taken to avoid injuring the bladder when opening the peritoneum, for this viscus may in cases of obstructed labour be considerably displaced upwards.

Opening the Uterus.—Before opening the uterus it should be

Fig. 244.—Cæsarean Section. Extracting the Child.

manipulated till the centre of its anterior surface corresponds with the abdominal wound.

The incision should be made through the upper segment because it is more retractile. Access to the desired site is obtained by lifting the upper edges of the abdominal wound upwards and outwards (Fig. 242).

The incision, which should be in the first instance about 2 inches long, should be rapidly accomplished, but care should be taken not to injure the underlying child. Directly the uterine cavity is

opened the incision should be extended till it is about 4 inches long (Fig. 243).

The bleeding during this part of the operation is free, especially if the placenta be attached anteriorly. In this event it should be

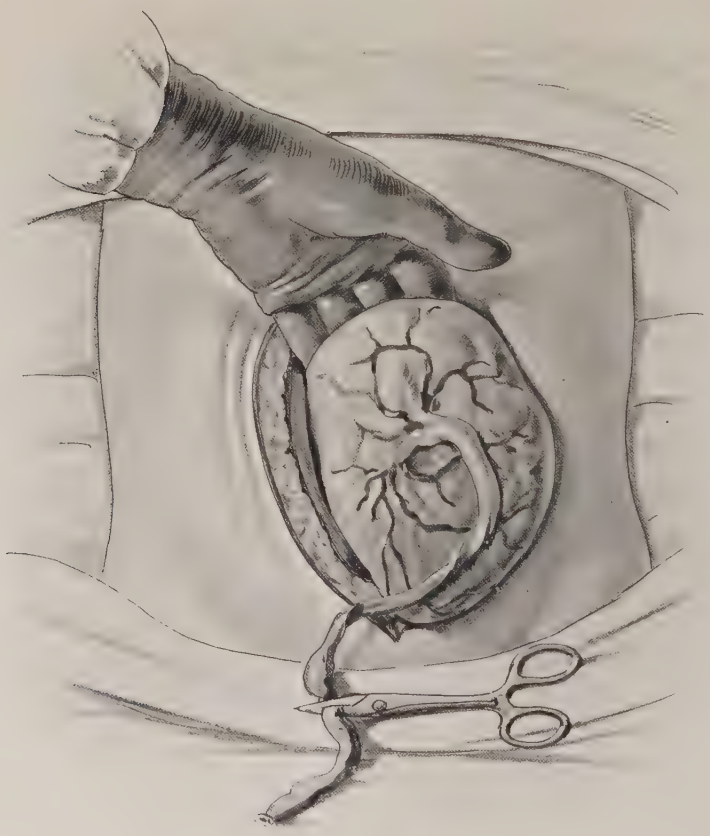


FIG. 245.—Cæsarean Section. ⅛ Removing the Placenta.

separated until the membranes are reached. To cut through it is undesirable, because it bleeds the child.

The bleeding from the cut edges of the uterine wall arrests with the retraction of the organ, except certain small arteries situated immediately under the peritoneal coat.

Delivery of the Child.—The child should be delivered by seeking for, seizing and drawing upon one of its legs (Fig. 244).

Ligation of the Cord.—If there is no untoward bleeding from the cut uterine wall, the cord should not be ligatured and divided until it has ceased pulsating.

If profuse hæmorrhage is going on, it is impossible to wait so long, and the child must be separated at once.

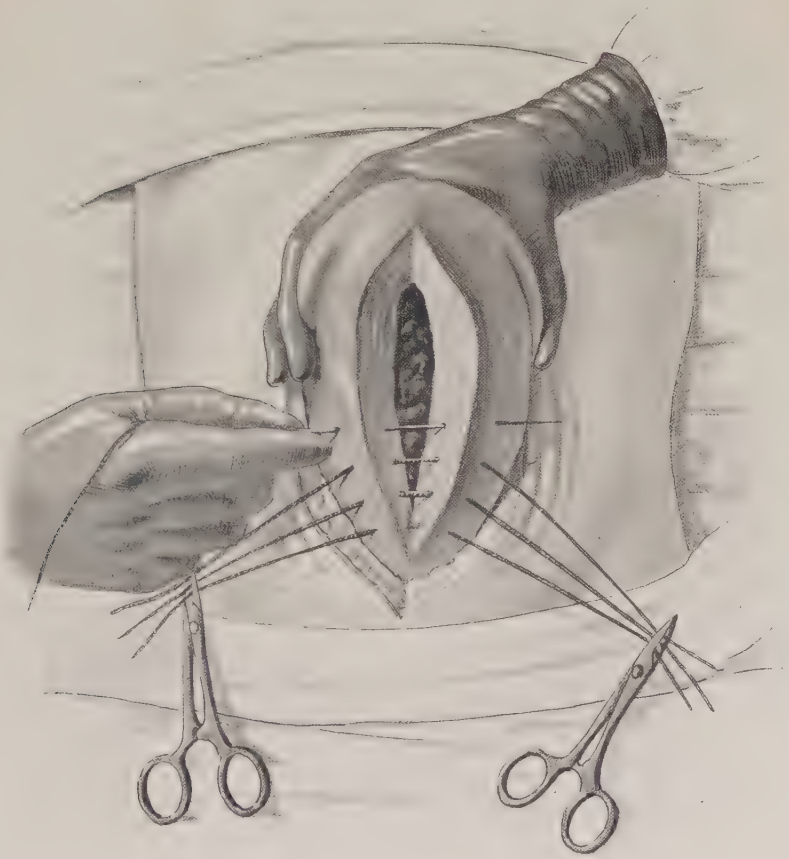


Fig. 246.—Cæsarean Section. Suturing the Uterine Incision. First Row of Sutures.

Removal of the Placenta.—The placenta and membranes should now be separated and removed (Fig. 245).

Care should be taken to see that no fragments are left behind.

Delivery of the Uterus.—The uterus should now be pulled through the abdominal wound.

If the parietal wound has been made of the size directed, it will be found that the uterus forms an obturator which prevents intestine from extruding.

Suturing the Uterine Wound.—This should now be effected by

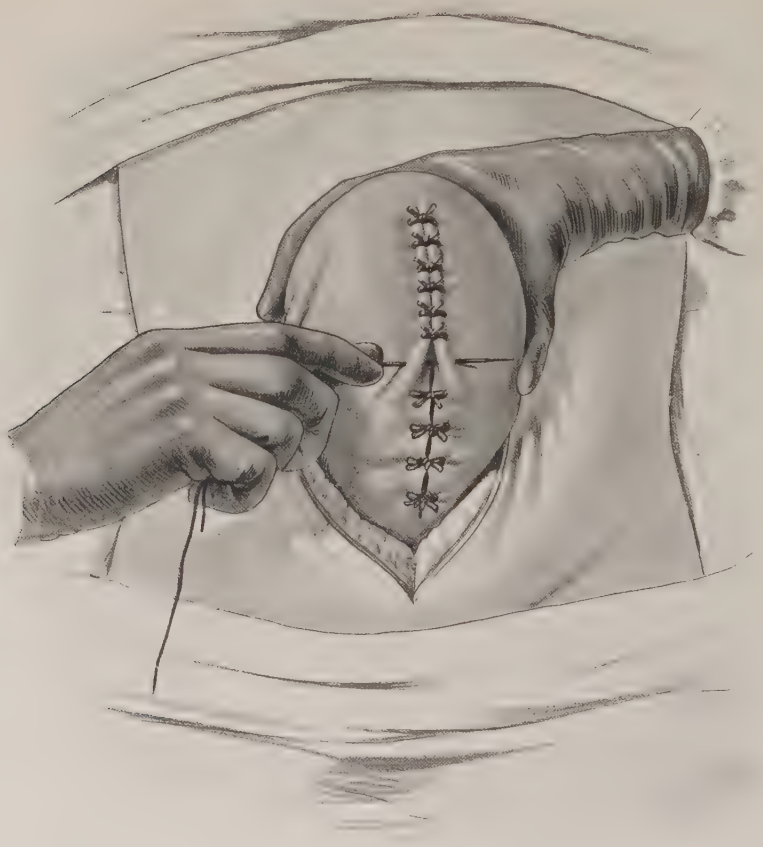


FIG. 247.—Cæsarean Section. Insertion of the Second Row of Sutures.

a series of interrupted No. 4 silk sutures passed through the serous and muscular coats, but just escaping the mucous membrane (Fig. 246). About six to eight are required. When they are tied it will be found that practically all the bleeding is controlled. An additional layer can now be added, more superficially passed and of the Lembert variety, so as to bury the main sutures and finally control all oozing (Fig. 247). If the uterine wall is very rigid,

Lembert sutures may cut out, and in this case ordinary ones should be used instead.

In all about fourteen sutures will be needed.

Sterilisation of the Patient.—If it has been decided to sterilise

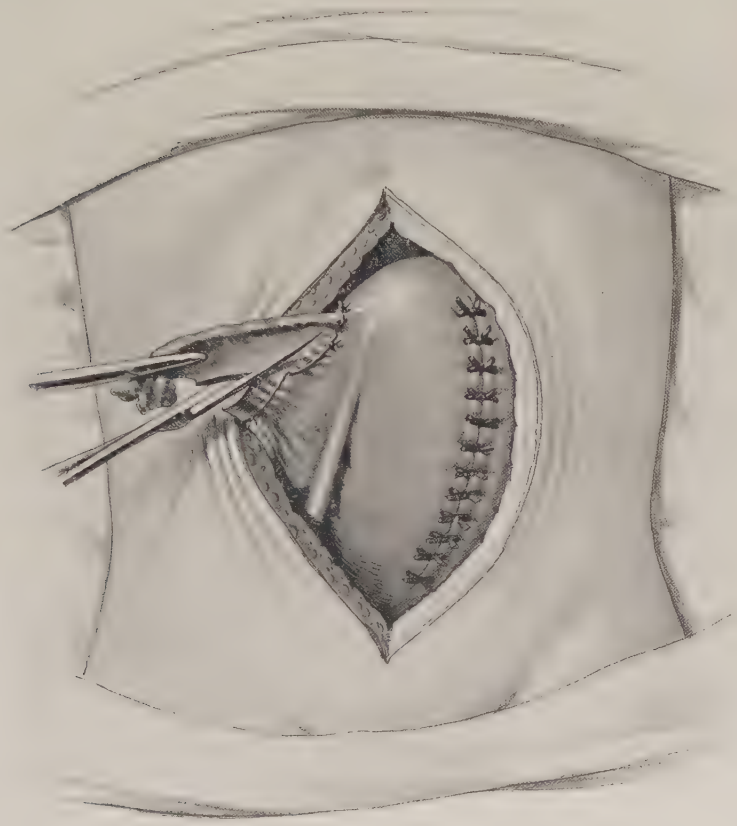


Fig. 248.—Cæsarean Section. Sterilisation by Resection of the Fallopian Tube.

the patient, this is best effected by picking up the tube on each side transfixing the meso-salpinx about 2 inches from its free edge with a needle armed with No. 4 silk, ligaturing it and the tube "in halves," and cutting off the portions distal to the ligatures (Fig. 248).

Peritoneal Toilet.—All blood or liquor amnii that has escaped into the peritoneal cavity should now be swabbed out and the uterus returned into the abdomen.

Closure of the Abdominal Wound.—There are various ways of closing the abdominal wound.

We prefer the "three-layer" method, namely, a continuous suture for the peritoneum, interrupted sutures for the aponeurosis, and Michael's clips or a continuous suture for the skin.

In emergency, however, only two layers may be employed, or even a single series of sutures including the whole thickness of the abdominal wall.

DIFFICULTIES.

Difficulty may be experienced in delivering the child; this is usually owing to the uterine incision being too small.

In exceptional cases the head may be so impacted in the pelvis that its disengagement is difficult. In such a case an assistant should help by forcing it up from the vagina. Cases are known where perforation has had to be performed before the head could be disimpacted.

Hæmorrhage.—Bleeding from the cut uterine wall ceases as the organ retracts, except the small arteries mentioned. The sutures control these. In same cases, however, retraction is deficient, and free hæmorrhage then occurs, both from the edges of the incision and from the placental site.

The former bleeding can always be stopped by sutures. For this purpose the "mattress" suture is the most efficient. Bleeding from the placental site must be checked, after the sutures are inserted and tied, by kneading and squeezing the organ, so as to stimulate it to retract, by the direct application to it of swabs wrung out in very hot water and by the injection of ergotin or pituitary extract.

In regard to ergotin it is a good plan to administer 10 minims of it as a routine measure just before making the abdominal incision, so as to guard against deficient retractability.

It may be noted that bleeding from the placental site usually stops spontaneously directly the uterus is sutured and returned to the abdominal cavity.

Sepsis.—Strict observance of the tenets of aseptic surgery will exclude the possibility of operative infection.

As has, however, been pointed out, the chief risk of Cæsarean section lies in the fact that the uterus is already infected in certain of the cases.

If in such circumstances the question of removal of the uterus after delivery of the child has to to be taken into account, this should certainly be done if it is proposed to sterilise the patient.

If this is not desired the operator must weigh the chances of serious infection against the advantages of conservative surgery,

and decide on the course to be pursued in accordance with the conditions peculiar to that particular case.

If it is decided to conserve the uterus, its cavity should be thoroughly wiped out with swabs soaked in 1 in 2,000 biniodide of mercury, but nothing should be passed through the cervix into the vagina.

In admittedly infected cases or those in which infection is gravely to be feared, the propriety of performing the extra-peritoneal operation should have been taken into account.

THE QUESTION OF STERILISATION.

If the operation is carried out for obstruction caused by a uterine myoma, the uterus in many cases must be removed. In osteo-malacia removal of the uterus is also indicated, together with bilateral oöphorectomy, see p. 316.

In admitted infection of the uterus its removal is also the best course, and also in those cases in which infection is gravely to be feared unless the extra-peritoneal operation has been adopted as an alternative.

When Cæsarean section is performed for eclampsia or placenta prævia, sterilisation is not indicated, but in accidental hæmorrhage removal of the uterus is usually the best course, because the organ is so deficient in retractility.

When performed for contracted pelvis the question of sterilisation is more difficult to decide.

Where the uterus is septic or suspectedly septic the course to be pursued has already been indicated.

In "clean cases" very close consideration is required. The following quotation from another work of ours [1] expresses the views we hold on this matter:

"From the national standpoint, sterilisation may be the means of depriving the community of useful citizens; from the domestic, the life of the Cæsarean child obtains thereby an additional importance, as no other children are possible to the woman; from the point of view of the interests of the patient herself, the sterility thus acquired may, in the case of a widow or an unmarried girl, be a serious handicap to the chance of future marriage. The risk of Cæsarean section is not increased by the repetition of its performance; whilst, on the other hand, sterilisation has the advantage of removing the menace from a deformity which in itself is a misfortune.

"We are of opinion that the pros and cons for sterilisation should be fully explained to the patient and her husband, and the decision

[1] A Textbook of Gynæcological Surgery. Cassell & Co., 1911.

left to them. If they do not express a distinct wish in the matter and the choice is left to the operator he should decide against sterilisation, since, if the domestic aspect of its performance be indifferent to the husband and wife, it behoves him to have regard to the interests of the community at large.

"If, on the other hand, the patient and her husband wish to avoid

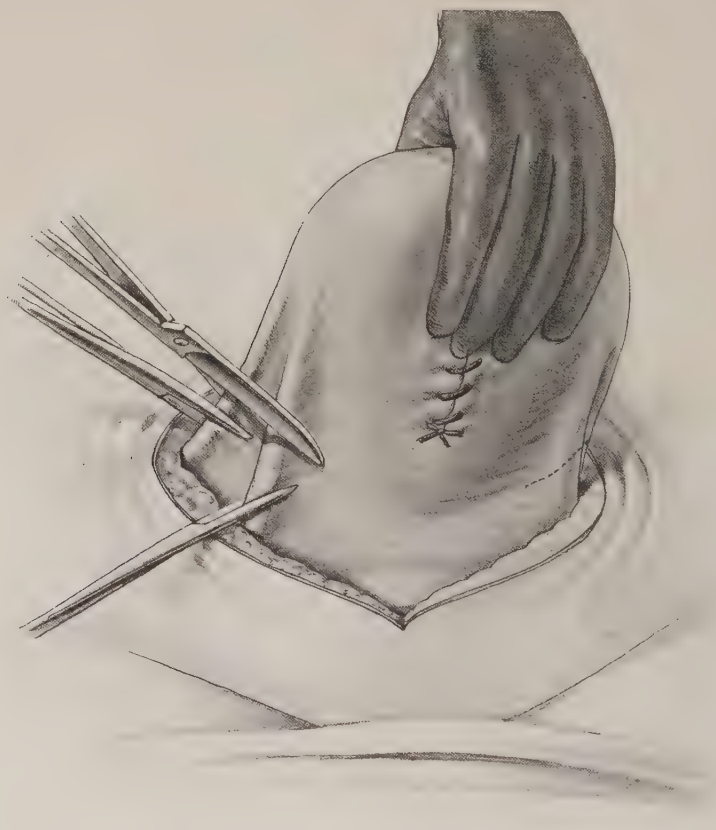


FIG. 249.—Sub-total Hysterectomy. Division of the Broad and Round Ligaments.

the possible repetition of the operation, the woman should be sterilised, but the operator should obtain leave to omit this step if the child is born dead or appears unlikely to survive. In respect of this last point, it is of great importance that the child should be very carefully examined directly it is born. The rectum in particular should be investigated, since impermeability of this organ has been overlooked."

AFTER-TREATMENT.

The after-treatment common to all the abdominal operations of obstetric practice is discussed on p. 690.

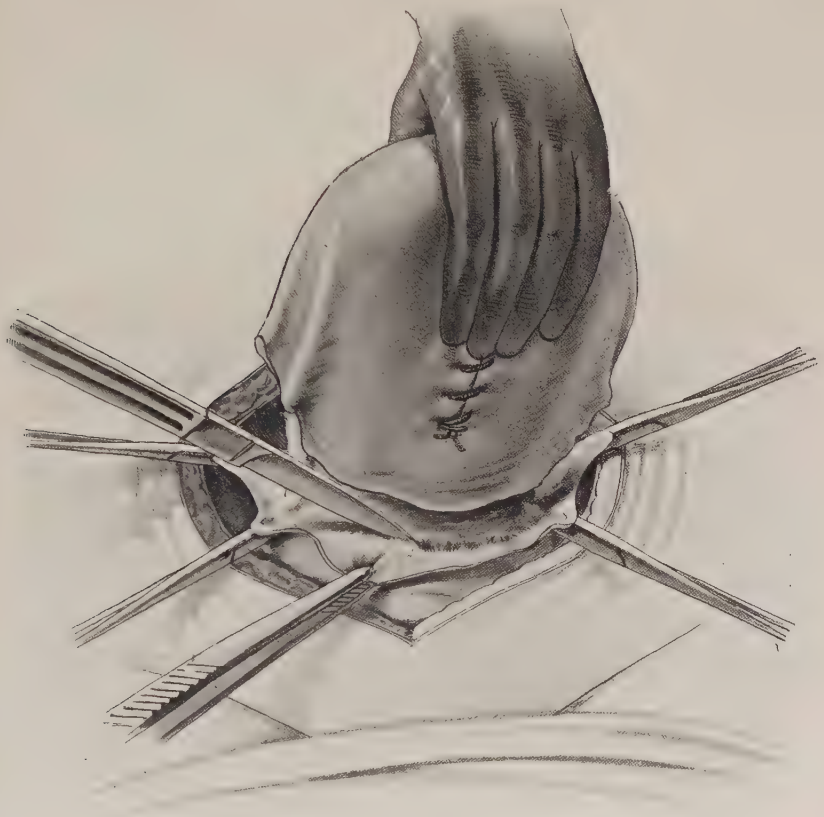


FIG. 250.—Sub-total Hysterectomy. Reflection of the Anterior Peritoneal Flap.

Cæsarean Hysterectomy.

INDICATIONS.

Cæsarean hysterectomy is carried out for the same conditions as conservative Cæsarean section, to which it is an alternative :

1. If it has been decided to sterilise the patient.
2. If the uterus is "suspect" or manifestly septic.
3. If the uterus is myomatous.
4. If the uterus is ruptured.
5. If the uterus is gravely misplaced, as in certain cases of obstructed labour due to ventrofixation.

6. In accidental hæmorrhage where the uterus is very flaccid.

In regard to removal of the uterus as a means of sterilisation we think that in a clean case in a young woman it is better to exsect

FIG. 251.—Sub-total Hysterectomy. Clamping the Uterine Vessels.

the tubes. Where, however, the patient is elderly, and especially if the uterus is "suspect," hysterectomy is the better course.

In frankly septic cases the uterus should certainly be removed entire.

Where the operation is being carried out for obstruction due to a

myoma, sub-total hysterectomy is the best proceeding, unless the case is septic. In the case of a ruptured uterus the whole organ should be removed. In obstruction due to misplacement it may be possible to divide the tethering adhesion and perform conservative

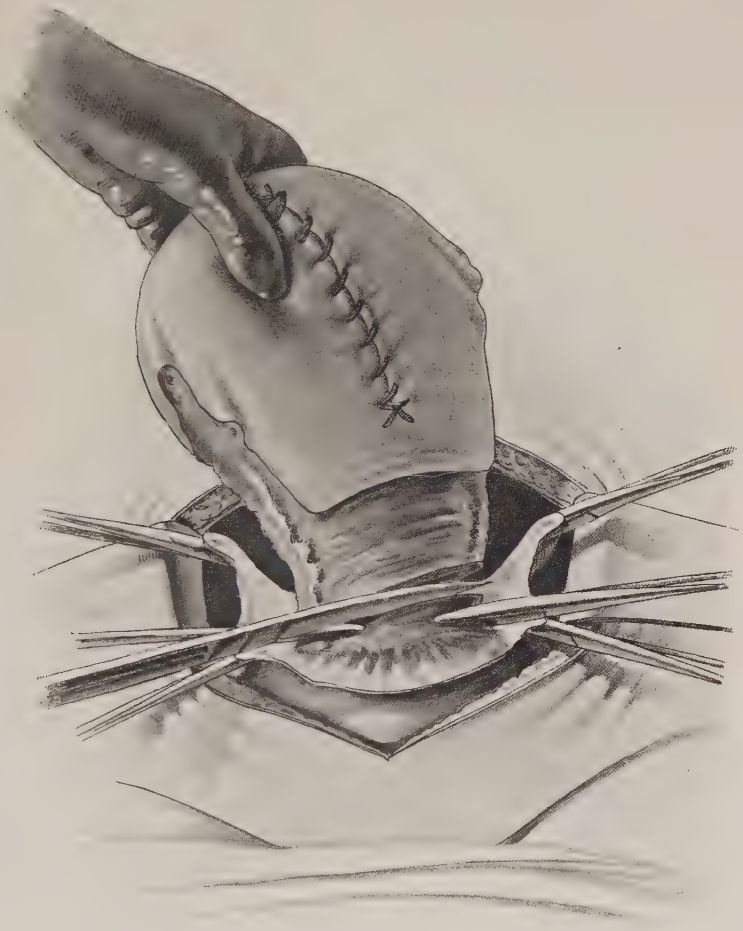


FIG. 252.—Sub-total Hysterectomy. Amputation of the Uterus.

Cæsarean section. In accidental hæmorrhage sub-total hysterectomy is the operation of election.

TECHNIQUE OF THE OPERATION.

The technique of the operation is similar to that of the conservative operation so far as the delivery of the child is concerned. In infected cases the uterus should be eventrated before incision.

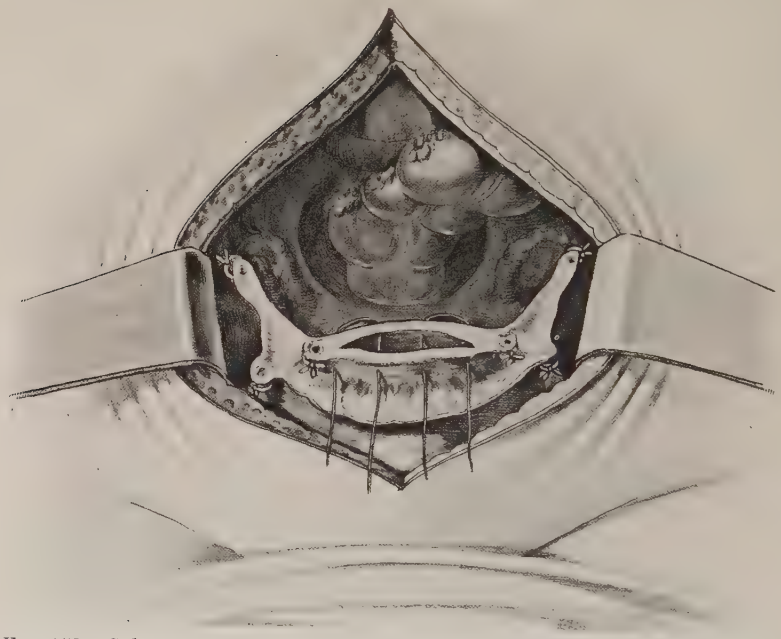


FIG. 253.—Sub-total Hysterectomy. Mattress Sutures inserted through the Stump.

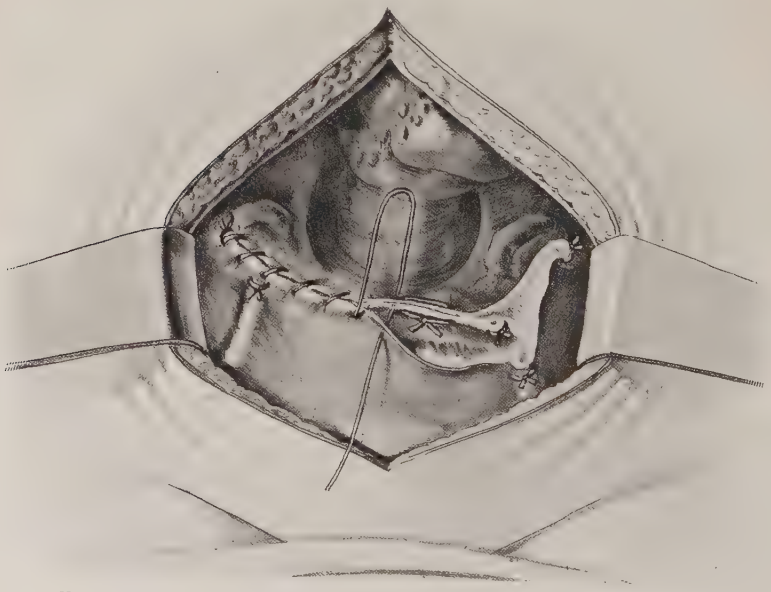


FIG. 254.—Sub-total Hysterectomy. Suture of the Peritoneal Flaps.

It is unnecessary to separate the placenta before removing the uterus.

The further steps of the operation depend upon whether the removal is to be sub-total or total.

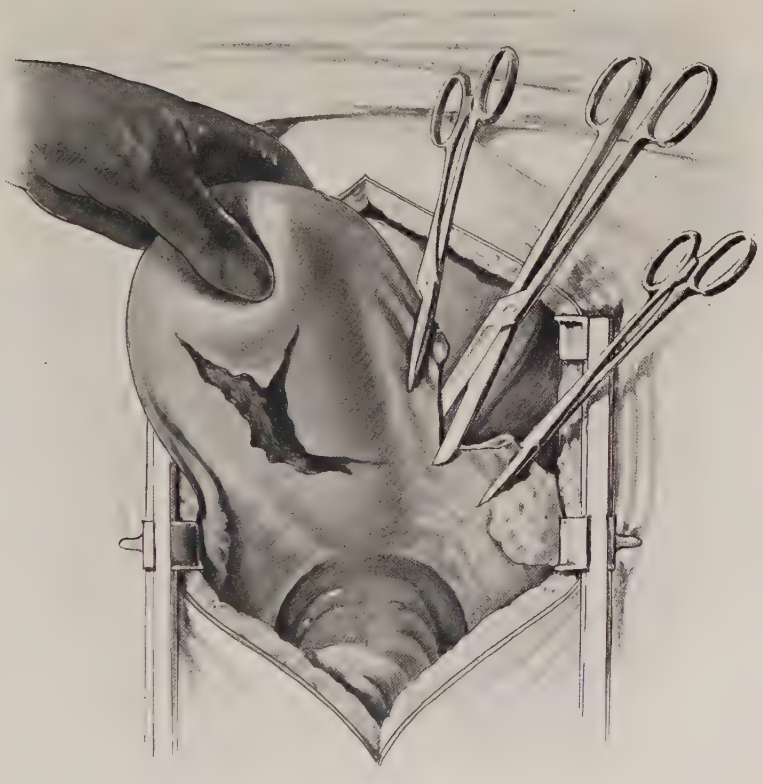


Fig. 255.—Total Hysterectomy for Rupture of the Uterus. Clamping Ovarian Vessels and dividing the Broad Ligament.

Sub-total Hysterectomy.

Division of the Broad Ligaments.—The uterus being pulled out of the wound, a pressure forceps is placed on the tube and ovarico-uterine ligament and another on the round ligament of one side, and these structures are then divided between the forceps and the uterus, bleeding points on the side of the latter being picked up with forceps (Fig. 249).

The same proceeding is then carried out on the opposite side.

Reflection of the Anterior Peritoneal Flap.—The loose peritoneum in the front of the uterus is now detached by under-

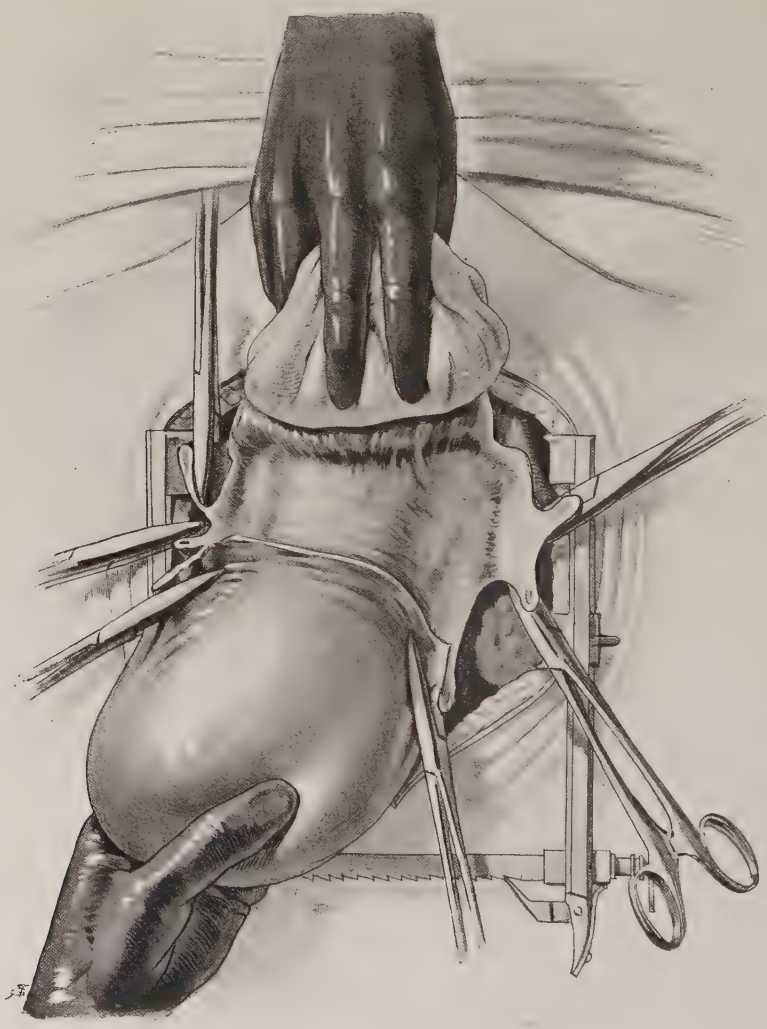


FIG. 256.—Total Hysterectomy for Rupture of the Uterus. Pushing back the Bladder.

running it with the finger and dividing it at its upper limit of attachment (Fig. 250).

Securing the Uterine Vessels.—The uterine artery on either

side is then sought for as it runs up the lateral aspect of the uterus, and a pressure forceps is applied to it (Fig. 251).

Amputation of the Uterus.—The uterus is now amputated just

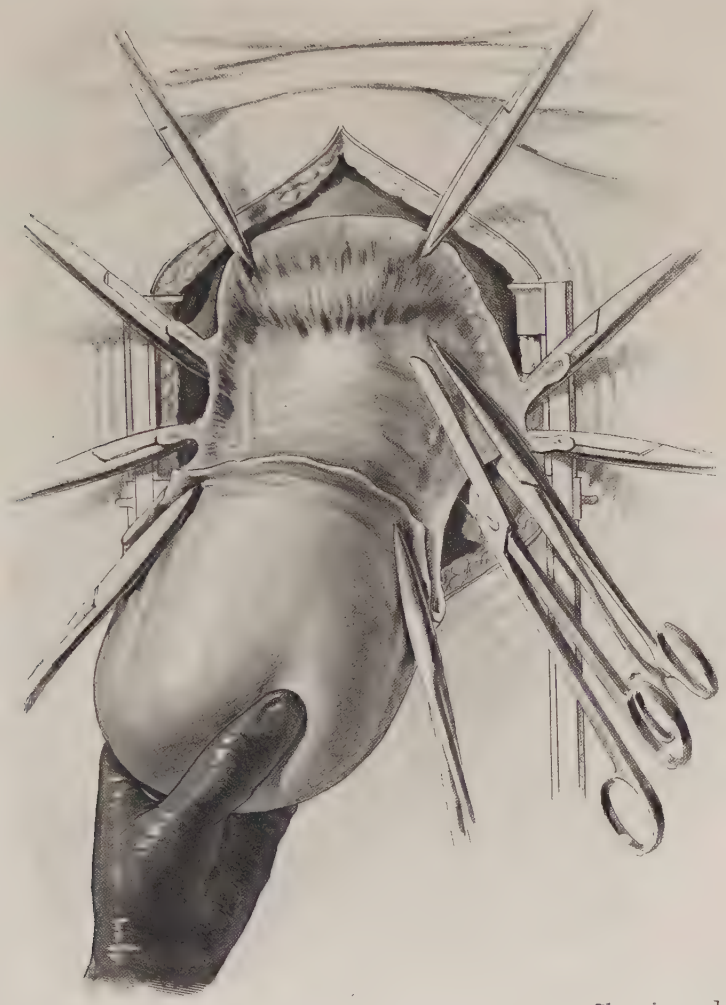


Fig. 257.—Total Hysterectomy for Rupture of the Uterus. Clamping and dividing the Uterine Vessels.

above the point where the forceps controlling the uterine arteries have been applied, *i.e.*, somewhat above the vaginal vault (Fig. 252).

Ligation of the Vessels.—Several bleeding points on the

cervical stump will require catching with forceps. These, together with those holding the avarico-uterine ligaments and tubes, the round ligaments and the uterine arteries, are then replaced by ligatures passed on a needle and tied under the forceps. The ligatures con-

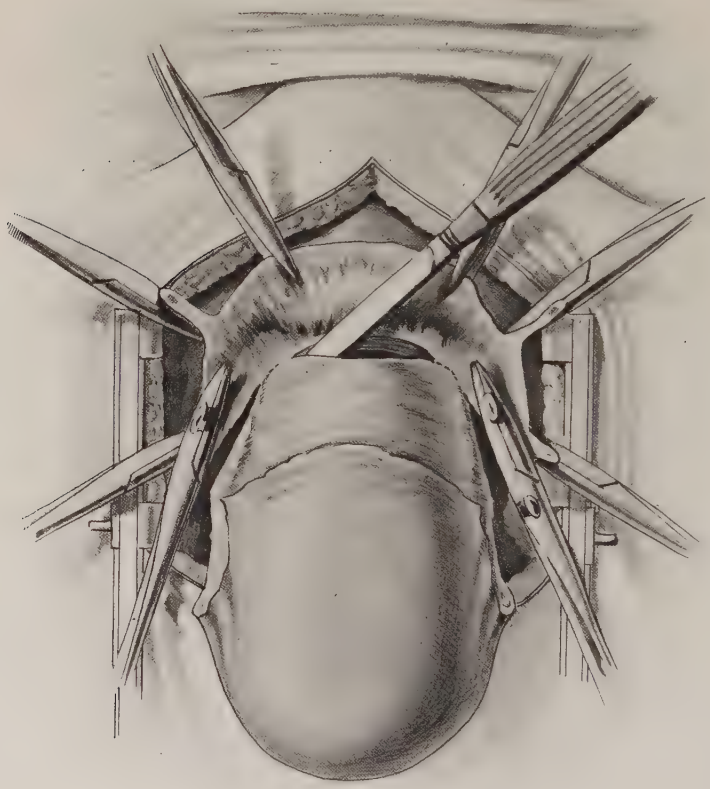


Fig. 258.—Total Hysterectomy for Rupture of the Uterus. Opening the Vagina.

trolling the oozing from the cervical stump should be of the "mattress" variety (Fig. 253).

Suture of the Peritoneal Flap.—The longer anterior peritoneal flap should now be united to the peritoneum, covering the back of the broad ligaments and the cervical stump by means of a continuous suture (Fig. 254).

Closure of the Abdominal Wound.—See p. 669.

Total Hysterectomy.

Division of the Broad Ligaments and Reflection of the Peritoneal Flap.—These stages of the operation are the same as in sub-total hysterectomy (Fig. 255).

Reflection of the Bladder.—The bladder should now be pushed

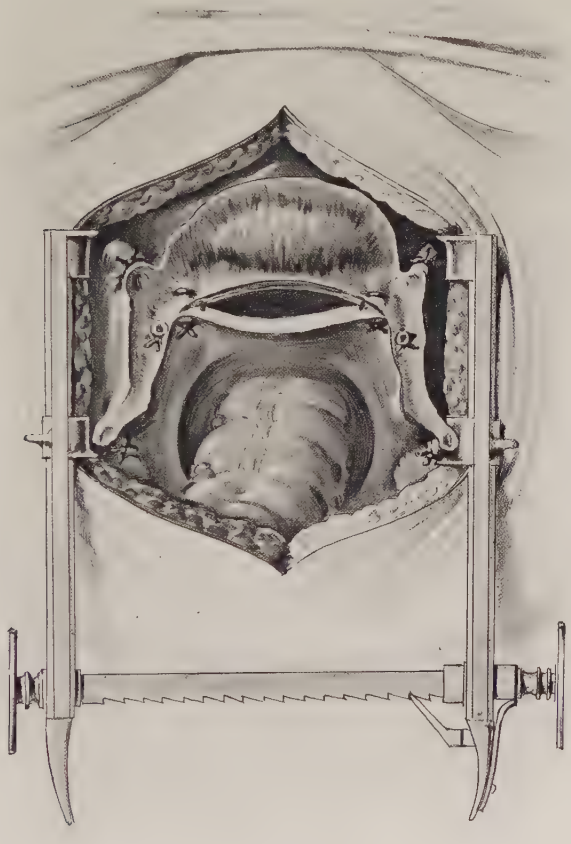


Fig. 259.—Total Hysterectomy for Rupture of the Uterus. Uterus removed, Uterine and Ovarian Vessels ligatured.

off the front surface of the cervix by swab pressure until the longitudinally running fibres of the vaginal wall are reached (Fig. 256).

Securing the Uterine Arteries.—A long-bladed pressure forceps should now be applied to the uterine arteries from above downwards

just before they reach the uterine wall. The tissue between them and the uterus should then be divided (Fig. 257).

Opening the Vagina.—The vagina should now be opened transversely with a scalpel (Fig. 258).

Removal of the Uterus.—This incision should now be extended laterally on either side, keeping inside the forceps holding the uterine arteries, and then continued through the utero-sacral ligaments and posterior uterine wall until the uterus is separated.

Ligation of the Vessels.—The forceps on the upper part

Fig. 260.—Extra-peritoneal Cæsarean Section. Pfannensteil's Transverse Incision.

of the broad ligaments are replaced by ligatures as in sub-total hysterectomy. The tissue containing the uterine artery should be transfixed just outside the forceps holding it and ligatured. A separate ligature may be passed round the mouth of the artery as well (Fig. 259).

The cut vaginal edges always bleed more or less, particularly the lateral vaginal arteries. These will require separate mattress ligatures.

Suture of the Peritoneal Flap.—All bleeding having been

arrested, the anterior peritoneal flap is united by continuous suture to the peritoneum covering the wall of the broad ligaments and the posterior wall of the vagina.

The latter canal is left open for drainage.

Closure of the Parietal Wound.—See p. 652.

After-treatment and Post-operative Complications.—See p. 690.

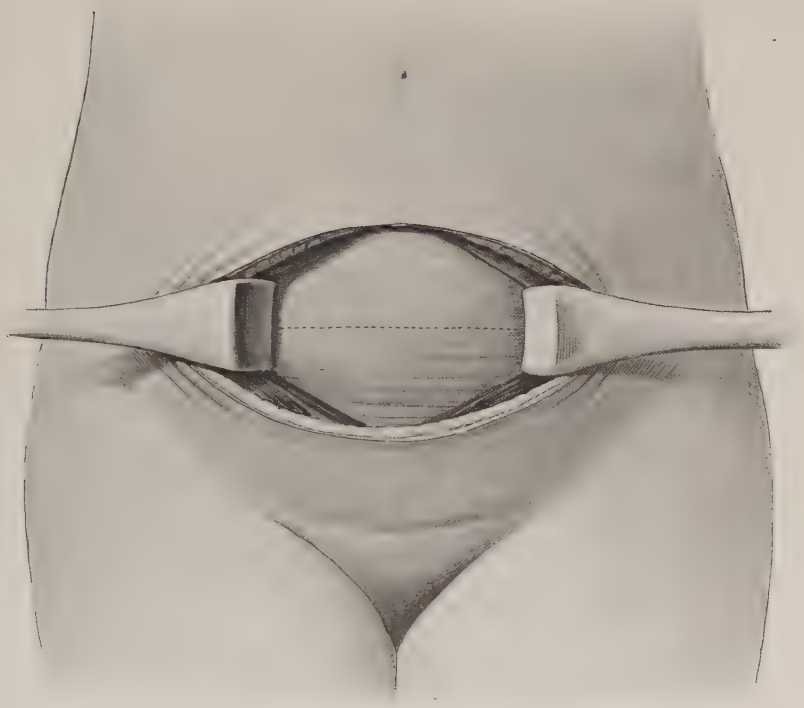


FIG. 261.—Extra-peritoneal Cæsarean Section. Peritoneal Cavity opened. The Dotted Line indicates the line of Incision of the Uterine Peritoneum.

Extra-Peritoneal Cæsarean Section.

This operation was designed by Sellheim to mitigate the dangers associated with trans-peritoneal Cæsarean section when applied to cases in which the uterus was already infected.

Its object is to exclude the opening into the uterus from the peritoneal cavity and thus avoid the risk of septic peritonitis.

There are several methods of effecting this. We shall only describe two.

Sellheim's Method.—The abdomen is opened by Pfannensteil's

incision, *i.e.*, transverse division of the skin and aponeurosis and vertical division of the recti muscles (Fig. 260).

The peritoneum having been reached, this membrane is pushed off the bladder as far down its posterior surface as possible, and it is then divided transversely.

The peritoneal cavity is thus opened. The loose peritoneum on the front of the uterus is now divided transversely just where it joins the fixed peritoneum covering the back of the bladder. This

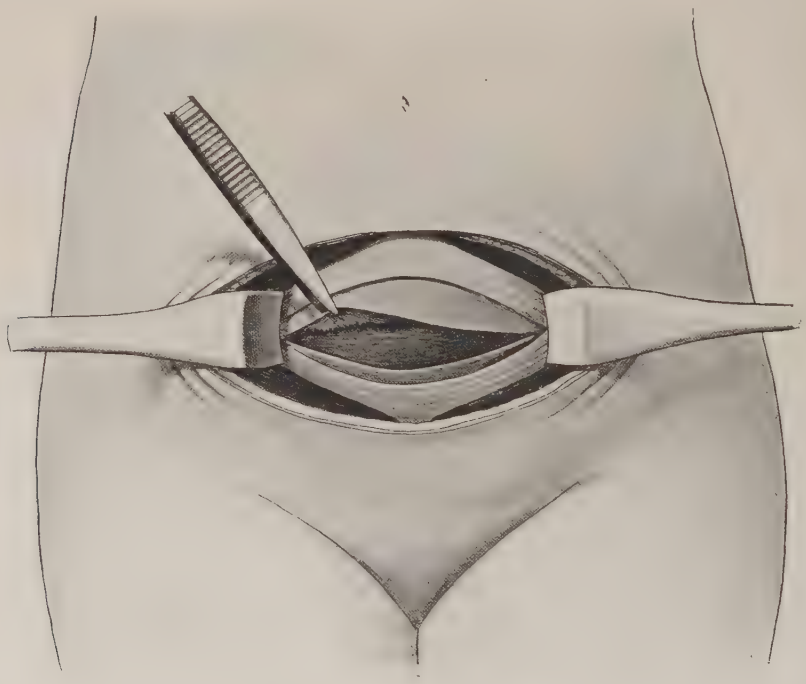


Fig. 262.— Extra-peritoneal Cæsarean Section. Elevating the Uterine Peritoneum.

transverse incision carried outwards on each side eventually joins the incision made in the parietal peritoneum (Fig. 261).

A flap of uterine peritoneum is now raised upwards (Fig. 262), and the cephalward cut edges of the peritoneum are carefully united by a continuous suture (Fig. 263), with a result that the general peritoneal cavity is cut off, and a space is isolated containing the bladder and the portion of fixed peritoneum attached to it and the front wall of the lower uterine segment (Fig. 264).

This wall is now divided vertically, the uterine cavity opened, and the child and placenta extracted.

The uterine wound is usually sutured, but where grave infection almost certainly exists it may be left open for drainage of the uterine cavity, the cut edges of the uterine wall being sutured to the parietal wound if necessary and a utero-abdominal fistula formed.

Latzko's Method.—This operation is truly extra-peritoneal, the abdominal cavity being unopened.

Pfannensteil's incision is performed as in the Sellheim method,

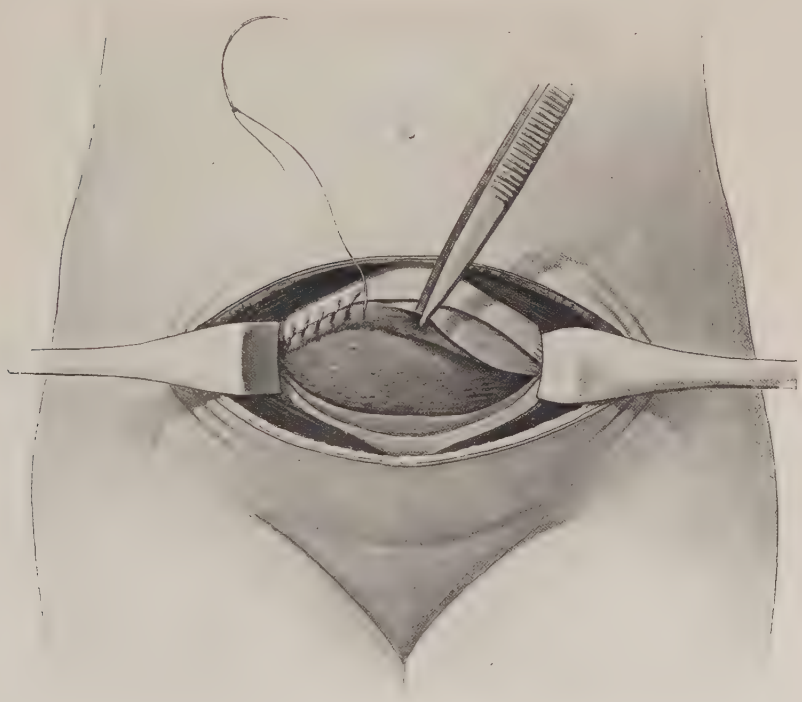


FIG. 263.—Extra-peritoneal Cæsarean Section. Suturing the Uterine Peritoneum to the Parietal Peritoneum.

but the peritoneal cavity is not opened. The lateral ligaments of the bladder on the left side are divided, and the viscus, together with the peritoneum covering its lateral aspect, are displaced to the right side, exposing the lower uterine segment.

The bladder is then further detached from the front of the cervix and the peritoneum of the utero-vesical pouch is pushed upwards as far as possible.

Sufficient space having thus been obtained, the lower uterine segment is divided vertically and the child and placenta extracted.

The uterine wound is subsequently sewn up or left open for drainage, as the case seems to require.

Comparison of the two Methods.—Of the two methods, that of Sellheim seems the simplest, and it further has the advantage that the tubes could be resected before making the peritoneal partition if it is desired to sterilise the patient.

The Value of the Operation.—This operation has not been extensively practised in Great Britain.

In clean cases it appears to us to be inferior to the classical

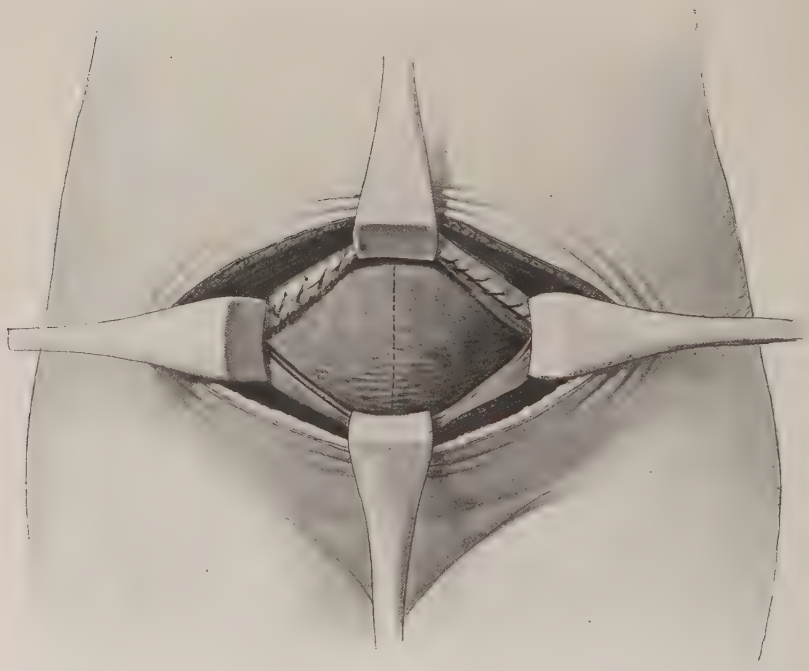


FIG. 264.—Extra-peritoneal Cæsarean Section. Exposure of the Uterine Wall. The Dotted Line indicates the line of Incision.

procedure, being more difficult and commanding no corresponding advantages.

In admittedly infected cases we believe that Cæsarean hysterectomy is the proceeding of choice, for though the extra-peritoneal operation excludes the risk of peritonitis from infection through the uterine wound, yet as it leaves the infected organ behind the possibility of puerperal sepsis due to placental site infection

remains. Moreover, severe cellulitis may arise in the tortuous track along which access to the uterus has been obtained.

We further dislike the Pfannensteil incision when suppuration of the parietal wound is possible, for in such an event a very weak scar results.

The operation would seem best fitted for those cases in which the uterus is suspect, but in which it is not desired to sterilise the patient.

FIG. 265.—Salpingo-oöphorectomy. Clamping and dividing the Ovarico-pelvic Ligament.

Hysterectomy of the Pregnant Uterus.

Under rare conditions it may be the best course to remove the pregnant uterus unopened.

That such a course does not necessarily involve sacrificing the life of the child is shown by a case in which one of us extracted a living child by incision from a uterus which our colleague, Bland-Sutton, had just rapidly removed by total hysterectomy.

The circumstances necessitating hysterectomy of the pregnant uterus are, however, such that the child is usually already dead.

Thus in the case of labour obstructed by a myoma with pro-

lapse of the cord, the latter being pulseless and the child obviously dead, it would be better in most cases not to open the uterus prior to removal.

Again, in a case of concealed accidental hæmorrhage occurring before the thirty-second week, or in any case if it appeared certain that the child was dead, the removal of the uterus unopened should be proceeded with straight away.

In a case where the child is still alive the operation is, as a

Fig. 266.—Salpingo-oöphorectomy. Ligation of the Rest of the Pedicle.

rule, not indicated, but in circumstances where grave intra-uterine sepsis was present this course might be preferred to incision of the uterus after eventration. It goes without saying that the amputation of the uterus after the uterine arteries have been clamped must be rapidly proceeded with or the child will be asphyxiated.

Technique.—The technique of the operation for removal of the pregnant uterus is that of hysterectomy as just described. The total operation should be performed when the uterus is septic.

SALPINGECTOMY AND SALPINGO-OOPHORECTOMY.

Removal of the tubes or entire appendages may be indicated in such obstetric conditions as puerperal sepsis, extra-uterine gestation and osteo-malacia, and as a method of securing sterility after Cæsarean section. The method of dealing with the tubes in the latter operation has been described.

Under the remaining conditions the operations of salpingectomy

FIG. 267.—Salpingo-oöphorectomy. Removal of the Appendage.

and salpingo-oöphorectomy are thus carried out: The preparation described in the article on Cæsarean section should be followed. The abdomen should be opened by a middle-line incision of ample length, and the condition carefully explored. Adhesions to bowel and omentum having been separated, the diseased appendage or appendages should be separated from the back of the uterus and broad ligament, and brought up out of the wound.

If the ovary is healthy it should be spared (except in osteo-malacia), and the tube alone removed by clamping the meso-salpinx with forceps and cutting it away with scissors up to its junction

with the cornu of the uterus. At this point a ligature should be applied and the tube removed distal to it. The cut edge of the meso-salpinx should then be dealt with by replacing the forceps, clamping it by "mattress" sutures so as to control the divided vessels. The abdominal wound should then be closed, the operation area being drained for a few days by a rubber tube.

If it is necessary to remove the whole appendage the ovarico-pelvic ligament should be clamped with forceps and divided (Fig. 265). The remaining attachments of the appendage, namely, the ovarico-uterine ligament and the upper part of the broad ligament, should then be transfixed below the course of the ovarian vessels and ligatured "in halves" (Fig. 266), after which the appendage is cut away (Fig. 267). The clamp on the ovarico-

Fig. 268.—Salpingo-oöphorectomy. The Pedicle ligatured.

pelvic ligament is then replaced by a ligature which secures the proximal end of the ovarian vessels (Fig 268). The wound is then closed in the manner previously described.

AFTER-TREATMENT AND POST-OPERATIVE COMPLICATIONS OF ABDOMINAL OPERATIONS.

After-treatment.

In the routine of after-treatment careful observations of the temperature and pulse and respiration rate are most important.

The value of the pulse in estimating the condition of a patient cannot be too strongly insisted upon. It should be highest during the first twenty-four hours, but should not then exceed 103 in any ordinary case. At the expiry of twenty-four hours it should have

fallen, a rising pulse after this period being very unsatisfactory. The temperature usually rises to 99° or 100° F. immediately after abdominal operations, but it should not in "clean" cases exceed this. A rising temperature after twenty-four hours is of bad import.

A rapid respiration rate immediately after the operation is due to shock or hæmorrhage. Beginning after twenty-four hours, it suggests some grave disaster at the operation site, such as peritonitis or intestinal obstruction.

Position of the Patient.—After abdominal delivery the patient should be propped up in bed as soon as the shock and effect of the anæsthetic have passed off. This is specially necessary where drainage is being employed.

Suckling.—The mother should nurse her child, unless some strong contra-indication exists. It should be put to the breast when the effect of the anæsthetic and the shock of the operation have passed off.

Bladder and Bowels.—Six hours after all abdominal operations the catheter should be passed in order to ascertain that the bladder is uninjured and the proper amount of urine is being secreted. After this the patient may be allowed to empty the bladder herself.

The passage of flatus per anum is of great importance, and this is assisted by the regular use of the long rectal tube for ten minutes at a time every four and six hours, beginning twelve hours after the operation and continuing until such time as flatus is passed naturally. Not much flatus is to be expected by the tube until twenty-four hours have elapsed since the operation. If after this it does not escape freely, the rectum must be washed out, see p. 693.

The bowels should be opened on the morning of the third day by an aperient given overnight, aided by an enema next morning if necessary.

Diet.—For the first twelve hours nothing should be ingested by the mouth. Thirst during this period is lessened by washing out the mouth frequently with warm water. The injection per rectum of 6 oz. of saline solution every two to four hours is excellent in shock, and mitigates thirst.

After twelve hours mouth feeding may be begun, first with small quantities of water, and later, if these are retained, with increasing quantities of milk and water, beginning with teaspoonfuls every hour, and increasing as the day goes on to larger quantities. For the first two or three days the diet should be liquid, consisting of milk, beef-tea, broths and meat essences at short intervals. Directly the bowels are open solid food may be taken.

The exact amount of fluid nourishment taken will vary in different cases, but in general it amounts to about 1 pint on the first day, 1½ pints on the second, and 2 pints on the third day after operation.

If vomiting prevents the retention of nourishment *per oram*, rectal saline injections should be substituted until it has passed off.

Dressings.—For abdominal operations a sterilised gauze-pad covered by sterilised wool is quite sufficient dressing. It need not be changed for forty-eight hours if all is going well unless drainage is being employed.

A vaginal douche should be given after total hysterectomy, but not until a week has elapsed, for fear of the solution finding its way into the peritoneal cavity.

Post-operative Rest in Bed.—The patient, as a rule, may leave her bed at the end of three weeks if she has progressed without complications.

The skin stitches of an abdominal wound are removed at the end of a week unless Michel's clips have been used. These should be taken out on the fourth day.

Post-operative Complications.

Vomiting.—Vomiting after an abdominal operation may be due to several causes, the most important of which are as follows:

Anæsthetic Vomiting.—This varies in intensity according to the patient and the character and dose of the anæsthetic. It should not last for many hours, and requires no treatment other than refraining from worrying the stomach by attempts at feeding.

Irritative Vomiting.—This is due to a gastritis set up by the anæsthetic. It may be very persistent in some cases and last for several days. The contents of the stomach, often highly bilious, are rejected. A degree of flatulent distension of the stomach often accompanies it.

It is distinguished from the graver forms of vomiting by the fact that the abdomen presents no untoward signs, nor are the pulse and temperature unfavourable.

In such a case the administration of a teaspoonful of bicarbonate of soda in 3 oz. of warm water, to which has been added a few drops of essence of peppermint, is often followed by relief.

The best treatment of all is to withdraw everything from the mouth, maintaining the patient's strength by rectal injections of saline solution.

Neurotic Vomiting.—Vomiting due to neurosis is occasionally met with, usually in cases where grave disaster at the operation

site is least to be feared. The patient is obviously trying to be sick, and the local and general conditions reveal no cause for anxiety. Many things can be tried, such as washing out the stomach, or a plaster or mustard plaster to the epigastrium. In some cases the addition of a little brandy to the feed tempts the patient to retain it. There is often a craving for morphia in these patients. Rectal feeding is the final resort.

Peritonitic and Obstructive Vomiting will be discussed under the heads of those complications.

Distension.—Epigastric and Flatulent Distension.—A certain amount of flatulent distension of the bowels occurs after most abdominal operations. It is probably due to the altered pressure conditions that obtain as a result of opening the peritoneal cavity. The distension usually begins in the stomach (epigastric distension) and gradually passes downwards, accompanied by painful consciousness of peristalsis, until the flatus begins to be naturally passed per anum. This event is rare until twenty-four hours have elapsed since the operation.

The condition has to be diagnosed from distension due to peritonitis or obstruction. Simple flatulent distension is always "soft," *i.e.*, there is no great tension present or undue rigidity of the abdominal wall, and though it may be accompanied by a degree of bilious vomiting, there is an absence of the signs of peritonitis and obstruction.

It should be treated by the regular introduction of the long rectal tube for ten minutes at a time, and if this proceeding fails at the end of twenty-four hours to bring away flatus, a wash-out or enema should be administered. A rectal wash-out is performed by introducing through the rectal tube by means of a glass funnel 10 oz. of a solution of soap and water to which $\frac{1}{2}$ oz. of turpentine has been added to each pint, or of normal saline solution. The fluid having been slowly run in is allowed to remain for five minutes, after which the funnel at the end of the tube is lowered into a basin of water and the solution allowed to run back, aspirating as it does so the gas from the bowel above. The proceeding is repeated three or four times until all the solution originally made is used up. The wash-out should be administered every four hours until the desired result is obtained.

If an enema is preferred it should consist of 1 pint of soap and water to which $\frac{1}{2}$ oz. of turpentine has been added. As an enema is more exhausting to the patient than a wash-out, it should be reserved until the latter has been tried and failed.

The administration of eserine sulphate or salicylate (gr. $\frac{1}{100}$)

every four hours by hypodermic injection, combined with strychnine sulphate (gr. $\frac{1}{33}$), is very useful in giving tone to the bowel wall. Pituitary extract has an even more powerful effect in this direction. It may be given alternately with the eserine and strychnine.

The Distension due to Peritonitis or Obstruction is dealt with under those headings.

Pain and Insomnia.—More or less pain is felt after all abdominal operations. It should be worst during the first twelve hours.

Pain coming on later than this indicates, as a rule, something amiss in the operation area, but after-pains may be very troublesome following on Cæsarean section.

After major operations it is unusual for the patient to sleep much during the first night, but persistent insomnia is unfavourable, being seen with painful conditions, such as peritonitis and obstruction or under circumstances of sepsis. It may also be the prelude to post-operative insanity.

It is good practice to give a small dose of morphia the first night after the operation. A sixth of a grain will usually suffice. Its habitual use is not advisable, for it masks symptoms, increases distension and vomiting, and is not successful in its effect in septic states.

If the pain is not very severe it can often be relieved by ten grains of aspirin.

For persistent insomnia, drugs like sulphonal, trional, paraldehyde or "bromidia" are better.

Post-operative Shock and Post-operative Hæmorrhage. — A consideration of the symptoms of these most important complications is very necessary, because they often closely simulate one another, whilst their treatment is diametrically opposed in nature.

Shock is usually a post-hæmorrhagic condition following a prolonged and bloody operation. Its symptoms date from the operation, whilst the symptoms of post-operative hæmorrhage appear some time afterwards.

In shock the patient is pale and cold, but usually quiet and listless, and complains of no pain. The pulse of shock may be fast or slow. It is always small, but—and this is a most important point—the artery is full, *i.e.*, its cord can be felt while the superficial veins are normally visible.

In hæmorrhage, on the other hand, the pulse is nearly always fast, the cord of the artery cannot be felt, and the superficial veins are barely visible. A patient bleeding to death is always distressed

and restless, "air-hunger" is present and great thirst, and with internal hæmorrhage there is invariably more or less pain over the abdomen with rigidity and tenderness. The distinction between shock and hæmorrhage may be difficult, and always requires careful consideration.

The treatment of shock consists in maintaining warmth, lowering the head, and administering rectal injections of ½ pint of saline solution every two hours, to which 1 oz. of brandy has been added. In the more severe cases continuous administration of saline solution, either into the cellular tissue or per rectum, is indicated, and gives excellent results. Intravenous saline infusion is an alternative, but is not so good as the methods just mentioned, because its effect on the blood pressure is apt to be temporary. It may be supplemented by continuous infusion with advantage.

Adrenalin and pituitary extract are both praised in this condition. The latter is the better to use, and the dose should be repeated every six hours if necessary. Alcohol and strychnine are very useful drugs.

If internal post-operative hæmorrhage is diagnosed, the only treatment is immediately to reopen the wound and secure the vessel, after which intravenous saline infusion should be performed. It should never be employed before the hæmorrhage has been arrested, as it merely precipitates the catastrophe under such circumstances. It is for this reason that the distinction between shock and post-operative hæmorrhage is of such vital importance.

Excessive bleeding from the placental site coming on after the abdominal wound has been closed should be treated by exploring the uterus from the vagina under an anæsthetic, clearing out clots, and douching the cavity with hot saline solution. Care must be taken not to loosen the sutures in the uterine wound. If these measures do not suffice, the cavity should be plugged with gauze as a last resort, the wound reopened, and the uterus removed.

Peritonitis.—*General* peritonitis is a disaster of the first magnitude, and few patients recover from it. The symptoms usually declare themselves about the third day, severe pain is complained of, especially in the upper region of the abdomen. The abdominal wall is motionless and rigid, and more or less distension is present. The pulse is quick and the temperature is usually considerably raised. Vomiting comes on early and is watery in consistence, and occurs independently of ingestion.

The diagnosis is usually easy on account of the characteristic rigidity and tenderness of the parietes, but in certain cases these features may be absent until shortly before death.

Treatment to have any chance of success must be prompt. The wound must be reopened, and the uterus if not already removed must be extirpated as the source of the sepsis. The pelvis must then be drained, while other openings should be made over the iliac and lumbar regions for the same purpose. Continuous saline infusion into the cellular tissue should then be performed with a view to maintaining strength, diluting the toxins, and promoting exudation through the drainage tube. The distension must be treated by rectal wash-outs, eserine, and strychnine, see p. 693.

Local peritonitis is not infrequently seen after operations on patients in whom the uterus was infected beforehand. In "clean" cases its occurrence is most often due to the presence of a collection of blood, formed by post-operative oozing from the uterine suture line or that covering the stump left by hysterectomy.

The lower abdomen is rigid and tender, and sooner or later a definite tumour can be felt there. In many cases the inflammatory mass makes its way up to the lower end of the wound and terminates in a free discharge of pus. In other cases it gradually subsides.

The treatment consists of antiseptic fomentations over the lower end of the wound and hot vaginal douches. If fluctuation is perceived, the swelling may be opened and drained either through the abdominal wound or the posterior vaginal vault, whichever appears most convenient.

Intestinal Obstruction.—Intestinal obstruction is either organic or paretic. The first is due to direct narrowing or kinking of the gut by adhesions, ligatures, or shortening of some of the peritoneal folds. The second is a rare condition, in which a segment of the intestine becomes paralysed and collapsed, probably as a result of prolonged exposure and injury to its mesentery.

In either organic or paretic obstruction the chief factor in the clinical condition is an acute ascending infection of the upper intestinal tract by intestinal bacteria in a state of exalted virulence.

In organic obstruction severe attacks of colicky pain occur, while in paretic obstruction there is a total absence of intestinal movement.

Flatus is with difficulty brought away or not at all, in spite of the passage of the long tube and rectal wash-outs, and the distension progressively increases. Vomiting, at first only occasional, becomes frequent, the material ejected being "intestinal" and finally fæculent.

In some cases of organic obstruction coming on slowly, diarrhœa may precede the symptoms of total occlusion.

The treatment consists in reopening the wound and dealing with

the obstruction, if it be organic in nature. If it be of such a nature as not readily to be relieved, the bowel above should be fixed in the wound and opened, and the correction of the occlusion left till a later date.

In paretic obstruction a considerable segment of the bowel will be found collapsed; above this portion the gut is much distended. The treatment of these cases is difficult because there is no way of removing the obstruction. The bowel above must be opened, but it is useless to perform this on the segment immediately above that of the collapse, for the intestinal walls are so inert that the aperture gives little or no relief. It is in most cases, therefore, necessary to perform enterostomy high up, a portion of the jejunum being chosen. This is the more necessary if the patient already has feculent vomiting, for this never occurs till the jejunum is full of the same material. Jejunostomy under these circumstances has given immediate relief. The artificial opening will have to be closed later either by suture or re-section.

Cellulitis.—Pelvic cellulitis may follow obstetric operations on the uterus. The symptoms presented are similar to those when it arises from causes other than operations, and the treatment consists in hot fomentations and vaginal douches until such time as pus is evident, when it should be let out by abdominal or vaginal incision.

Cardiac Failure.—In lying-in hospitals particularly, many of the older patients are the subjects of general ill-health due to malnutrition or alcoholism. In such fatty degeneration of the heart is common. These patients bear severe operations badly, the heart acutely dilating under the strain.

The condition is very serious. Alcohol and strychnine are the most useful drugs. Digitalis should on no account be given, as it not only has no beneficial effect, but often produces acute failure of the cardiac muscle.

Pulmonary Complications.—Bronchitis or broncho-pneumonia, due to the anæsthetic, is not uncommon. It should be treated by a bronchitis-tent and the steam-kettle. Poultices to the chest are comforting, and the patient must be sat up.

The following prescription is useful: ℞—Ammon. Carb., gr. 3; Sodii Bicarb., gr. 20; Sp. Chlorof., ♏ 10; Aqua Anise, ad ʒj; every four hours.

Lobar pneumonia occasionally occurs, and requires the usual treatment. Septic pneumonia is an almost hopeless condition.

Pulmonary embolism is the most tragic catastrophe following obstetrical operations on the uterus. It is commonest after hysterectomy. It usually takes place between the tenth and

twenty-first day following the operation. In most cases the patient dies after a brief period of dyspnœa, cyanosis and coma, but recovery is known.

The treatment consists in artificial respiration so long as the heart beats, injections of strychnine and ether, and the use of oxygen if it is available. Venesection is proper where with great cyanosis the heart is still beating strongly.

In most of these unfortunate cases no cause for the embolism is apparent. In some, slight fever and undue frequency of the pulse is noticed, probably due to subacute phlebitis. Very anæmic patients are most liable to the disaster.

Femoral Thrombosis.—"White leg" may follow on abdominal delivery as after labour by the natural passages. Its treatment is discussed on p. 517.

Parotitis.—Parotitis is most often associated with some septic condition of the operation area, and in these cases may be septicæmic in origin. In others it is probably secondary to oral sepsis. One or both glands may be affected. It usually subsides without suppuration, but occasionally pus forms.

It is to be treated by warm fomentations, and with morphia if need be to relieve the pain. If suppuration occurs, the gland must be incised, having regard to the important nerves and vessels in this region. The patient is always much debilitated, and will require tonics and alcohol.

Complications in the Parietal Wound.—Immediate *suppuration* of the wound is chiefly seen after prolonged operations on patients already infected. It usually, however, supervenes during the second week, and is then due to an infected buried suture. The abscess must immediately be freely opened up and drained and the offending stitch or stitches removed.

Stitch sinuses arising from buried sutures are very troublesome.

Patience should at first be advised unless the suture can be felt or seen, when it should be removed. For this purpose a steel crochet-hook is often successful. If in spite of waiting many months the sinus refuses to close, an attempt to remove the suture by cutting down on it is permissible. These operations vary in difficulty, being easy when the suture is situated superficially, but very difficult and distinctly dangerous if placed deeply, as, for instance, in the uterine wall or in the stump left after hysterectomy.

In dressing a suppurating abdominal wound the separated skin edges should be approximated as far as possible, so as to reduce the amount of scarring, favour rapid healing, and leave as strong a scar as may be possible under the circumstances. The best

method of doing this is by means of pieces of strapping fixed on either side of the wound, but terminating about 1 inch from the edge of the wound. These ends should be over-folded for about 1 inch and have pieces of tape attached to them. Each strip should then be attached to its *vis-à-vis* on the opposite side of the wound by tying the pieces of tape together across the middle line.

Frequent re-strapping of the wound for purposes of dressing, a process which may produce an eczematous condition of the skin, is thus avoided.

Bursting of the wound is a serious complication, and most often occurs in persons with weak parietes and post-operative bronchitis and cough. It may also occur as a result of excessive retching. In either case the sutures may give way or cut out. The bowel extrudes through the wound, and may be found under the dressing. If the skin layer has held, the rest giving way, the bowel becomes adherent to its under-surface, and symptoms of intestinal obstruction appear.

The condition is obvious when the bowel extrudes. Where the skin layer has held, the presence of a resonant tumidity along the wound with oozing of blood or serum between the stitches should suggest the disaster.

In the first case the bowel should be washed with saline solution and returned, and the wound then re-closed. In the second the skin sutures must be taken out, the bowel separated from its adhesions and returned, and the wounds closed anew.

A *scar hernia* is commonest in wounds that have suppurated and are weak from this cause. It may also be due to sutures giving way prematurely or to natural flabbiness of the tissues of the abdominal wall, especially when increased inter-abdominal tension is present as well.

Scar hernias should be operated upon; except very large ones in feeble fat women, for whom an abdominal belt will be found more satisfactory.

The operation consists in opening the abdominal cavity above the hernia sac, exploring its contents, and then re-secting it together with the skin covering it. Adherent omentum or gut are dealt with as appears most convenient. The edges of the wound are trimmed up, and it is then closed by several layers of sutures.

Bladder Complications.—*Cystitis* is seen after abdominal delivery in cases in which the bladder has been subjected to severe pressure; careless catheterisation may also be the cause of it.

The colon bacillus is the common causative organism; in other cases the staphylococcus or streptococcus.

The bladder must be washed out twice daily with boric acid solution, and salol or urotropin given by the mouth.

Retention may occur after abdominal delivery under the same circumstances as it may follow normal labour, see p. 66.

The catheter must be passed regularly in all conditions in which a full bladder would adversely influence the operation site.

Incontinence may be due to overflow from distension or to a vesical fistula. In the first case the catheter must be used. In the second the aperture must be sutured, but not until all cystitis has disappeared.

VAGINAL CÆSAREAN SECTION.

INDICATIONS.

Vaginal Cæsarean section vies with abdominal Cæsarean section as the most rapid method of evacuating the uterus in the later months of pregnancy. It is indicated, therefore, where urgency for immediate delivery exists, the cervix being not at all or only slightly dilated.

Such urgency arises principally in certain cases of eclampsia, accidental hæmorrhage, pernicious vomiting, and chorea, and advanced cardiac or pulmonary disease complicating pregnancy.

In comparing the vaginal operation with the classical abdominal one, it may be remarked that the former is easier the earlier in pregnancy it is performed, because the smaller the child the more readily it is extracted. Further, the operation is facilitated by the capacious vagina present on multigravidæ. Under any circumstances, however, the mortality of the child is greater than obtains in abdominal Cæsarean section.

It is, therefore, only to be preferred to the latter when it is carried out some time before term, when the life of the child is a negligible consideration, or when some strong contra-indication to the abdominal operation exists. It is best suited to bad cases of eclampsia occurring in the seventh month.

In cases of extreme cervical rigidity, see p. 310, it is a preferable step to the use of Bossi's dilator, especially if the cervix be long.

Technique of the Operation.

Preparation of the Patient.—The vulva is shaved and one or more vaginal douches of 1 in 2,000 biniodide of mercury are given, according to the time that elapses before the operation.

Incision of the Mucous Membrane.—The patient is placed in the lithotomy position, a final douche is given, Auvard's speculum is

inserted, and the cervix is brought well into view by means of two ring forceps. The mucous membrane in front of the cervix is then incised from the base of the vestibule to the external os (Fig. 269).

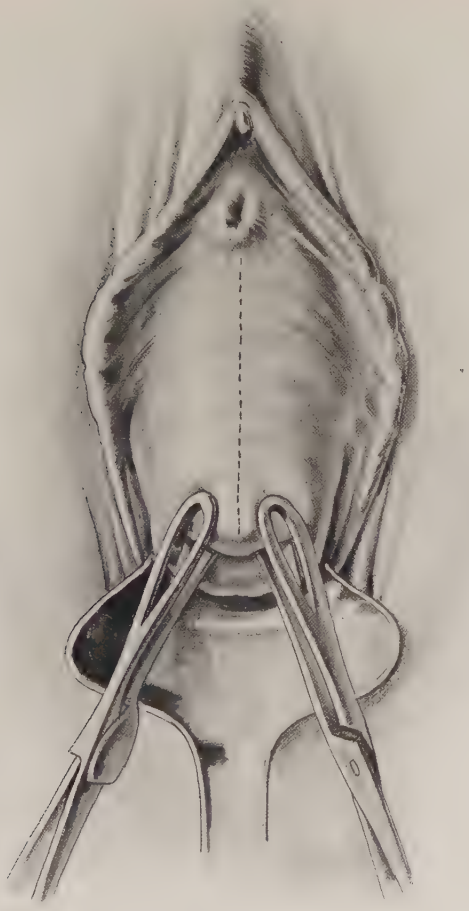


FIG. 269.—Vaginal Cæsarean Section. Incision in the Mucous Membrane.

Separation of the Bladder.—The bladder is next carefully separated with the fore-finger and pushed up above the level of the internal os (Fig. 270).

Anterior Division of the Cervix.—A retractor is now placed in the wound and held up by an assistant, so that the bladder is kept out

of the way. The anterior wall of the cervix is then divided with a pair of sharp-pointed scissors above the level of the internal os (Fig. 271).

Separation of the Divided Cervix.—The cervical canal is now

FIG. 270.—Vaginal Cæsarean Section. Separating the Bladder.

enlarged by traction on the divided edges of the cut cervix, when the membranes will present (Fig. 272). The membranes are then ruptured.

Extraction of the Child.—The child is now delivered either by forceps traction or by podalic version. If the head is small and the

presentation favourable, forceps are best. If the head is large or the presentation faulty, podalic version had better be employed, the after-coming head being perforated if necessary.

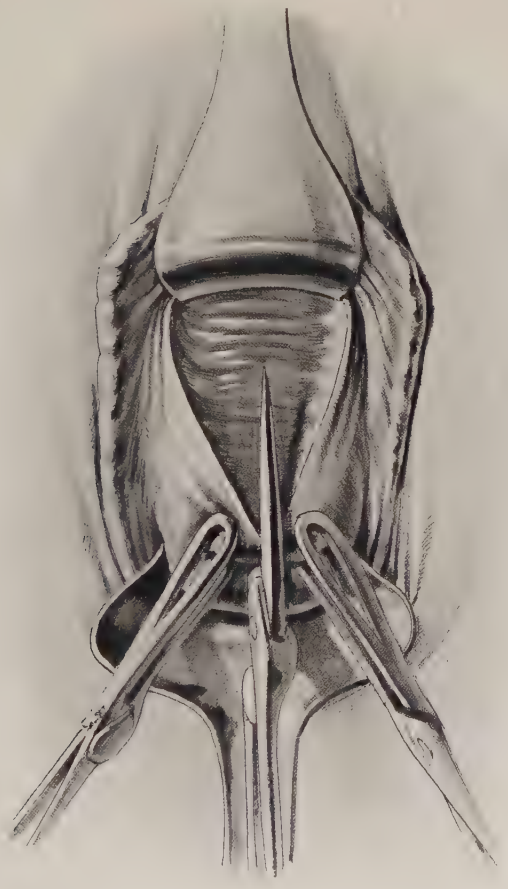


Fig. 271.—Vaginal Cæsarean Section. Dividing the Cervix anteriorly.

The child being delivered, the placenta and membranes are then removed manually.

Suture of the Muscular Coat.—After the uterus has well retracted the divided muscular coat is sutured with a series of interrupted silk or catgut sutures (Fig. 273).

Suture of the Mucous Membrane.—Lastly the cut edges of the

mucous membrane are united with a continuous catgut suture (Fig. 274).

Difficulties.—If sufficient room cannot be obtained by division of the anterior wall of the cervix, the posterior wall of the cervix can

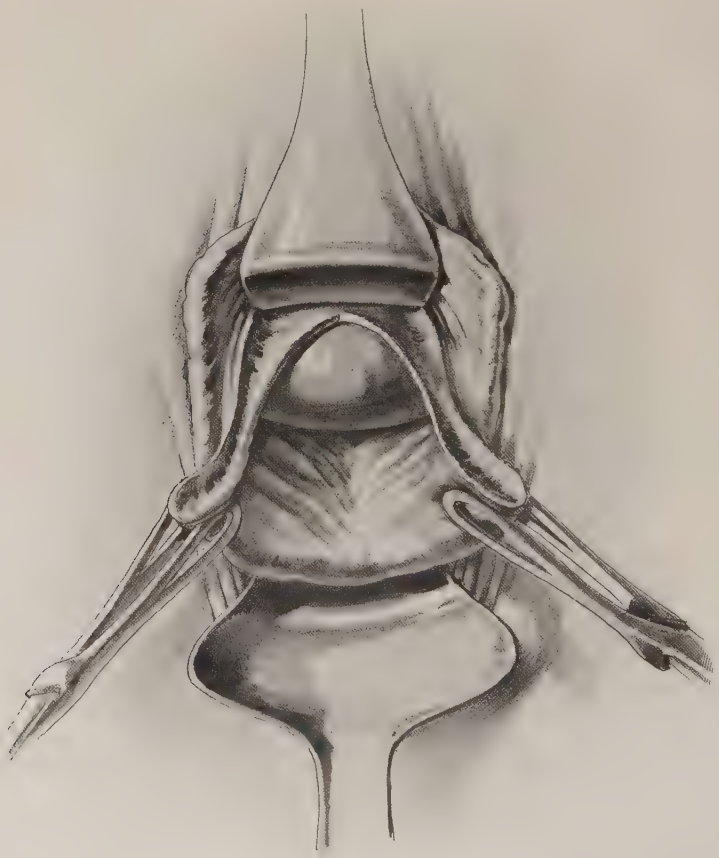


Fig. 272.—Vaginal Cæsarean Section. Separation of divided Cervix. Presentation of the Membranes.

also be divided, the operator cutting through it with a pair of scissors as far as the posterior vaginal vault, after which the mucous membrane at the vault must be divided and the peritoneum forming the lowest limit of Douglas's pouch must then be pushed off the cervix before the incision is carried up to the uterine cavity.

If the vagina is small, it can be enlarged by a para-vaginal section.

Dangers.—The principal danger connected with the operation is

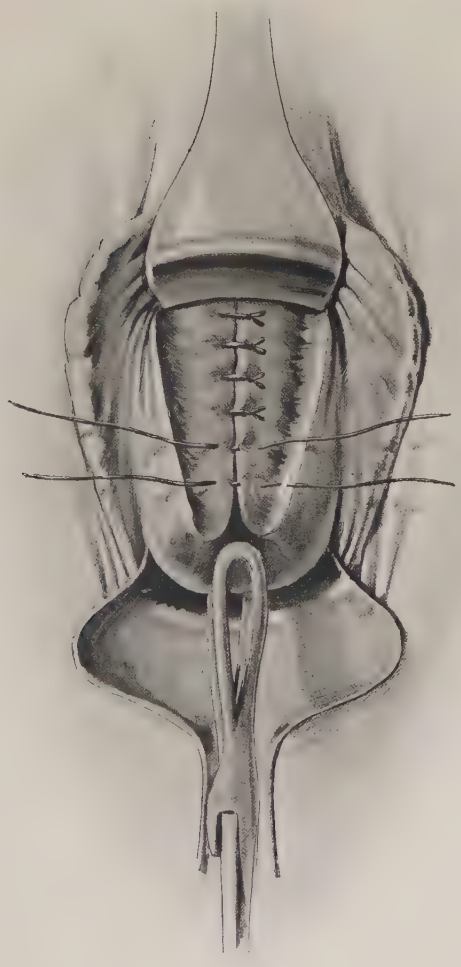


FIG. 273.—Vaginal Cæsarean Section. Suture of the Muscular Coat.

that the bladder may be wounded. The hæmorrhage may also be considerable. It is an operation that should only be attempted by one skilled in vaginal surgery, and then only with reliable assistants and adequate surroundings.

THE ADMINISTRATION OF SALINE SOLUTION.

INDICATIONS.

The administration of saline solution may be indicated in patients

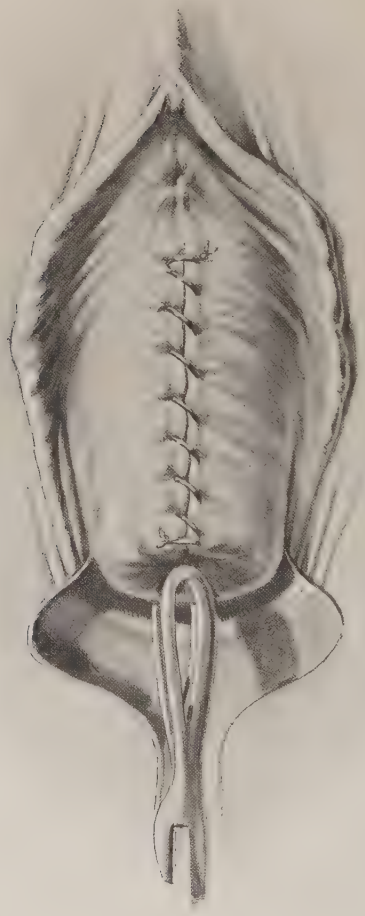


FIG. 274.—Vaginal Cæsarean Section. Suture of the Mucous Membrane.

suffering from the effects of hæmorrhage or shock from pernicious vomiting, from the acute albuminuria of pregnancy, from suppression of urine, or from septic puerperal fever.

Composition of the Solution.—By adding a teaspoonful of table

salt (sodium chloride) to a pint of boiled water, "normal saline" solution is obtained.

Temperature in Administration.—For intra-venous injection the solutions should be introduced at a temperature of 100° F.; the solution in the container should therefore be at 105° F. For subcutaneous injection the solution in the container should be at 108° F. For rectal injection the solution should be at 105° F.

Methods of Administration.—Normal saline solution can be given by a vein, by the subcutaneous tissue or by the rectum.

Relative Advantages of each Method.—Intra-venous injection is the quickest method of introducing fluid into the circulation, and it is therefore particularly indicated in urgent cases following hæmorrhage.

Subcutaneous Injection is a slower method, but larger quanties of the solution can be administered in this way with much less risk of pulmonary œdema supervening. It is therefore particularly indicated in toxæmic conditions of pregnancy and in septic puerperal fever in which it may be necessary to administer large quantities—as much as 16 pints in the twenty-four hours.

This method is described on p. 505.

Rectal Injection is the easiest method, and can be used as an adjuvant to the other two. It is most useful as a routine practice after abdominal operations, and is indicated in cases where the symptoms are not severe enough to warrant intra-venous or subcutaneous injection.

Intra-Venous Injection.

Treatment of the Wound Area.—The median-basilic or median-cephalic vein having been chosen as the one to open (any vein will do), the skin covering this region is painted with tincture of iodine.

Instruments.—The following instruments and apparatus are required: A scalpel, dissecting forceps, pair of pressure forceps, an anuerysm needle, No. 2 silk ligatures, a bandage to constrict the veins in the arm, a container for the solution, an indiarubber tube, a cannula with the opening at the end, and a thermometer. The injection apparatus devised by one of us contains the necessary articles, and is convenient for private work; whilst soloids of chemically pure sodium chloride can be purchased, one of which to a pint of water makes normal saline solution. The instruments and apparatus should be sterilised before use, and the solution should be mixed in a jug before it is poured into the container.

Steps of the Operation.

Exposing the Vein.—The arm is bandaged well above the

FIG. 275.—Saline Venous Infusion. Exposing the Vein.

elbow. This will prevent reflux of venous blood, and also make the vein more prominent. The skin over the vein is then divided, and

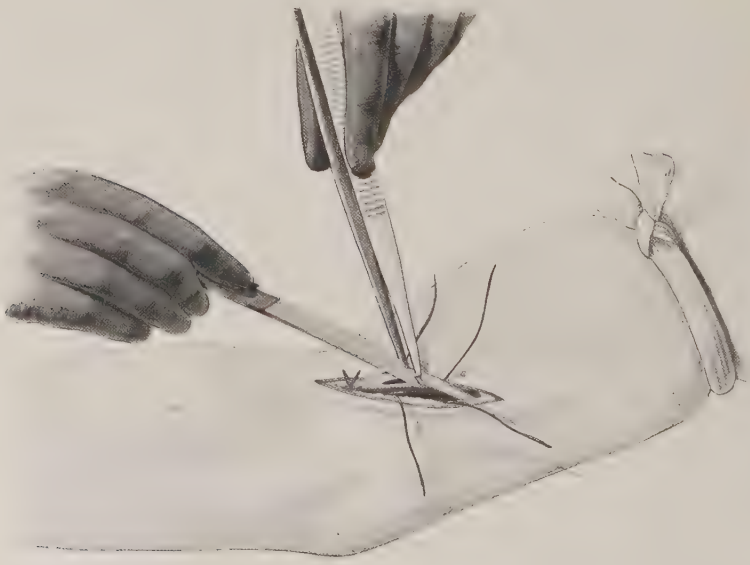


FIG. 276.—Saline Venous Infusion. Opening the Vein.

the vein being exposed should be freed for a small part of its length (Fig. 275).

Occluding the Vein in the Lower Angle of the Wound.—Three ligatures are now passed under the vein with an aneurysm needle (a Bonney needle used the blunt end first will do as well). That portion of the vein situated at the lower angle of the wound is then ligatured, the remaining ligatures being kept to tie in the cannula, and to occlude the proximal end of the vein when the injection is finished.

Opening the Vein.—A longitudinal opening is made in the vein with the point of the scalpel (Fig. 276).

Inserting the Cannula—One edge of the opened vein is held

Fig. 277.—Saline Venous Infusion. Introduction of the Cannula.

apart whilst the cannula is introduced through the opening into the vein, the saline solution being allowed meanwhile to escape in a small stream so that air-bubbles in the fluid may be expelled (Fig. 277).

Fixing the Cannula.—After the cannula is introduced it is fixed in position with one of the remaining ligatures (Fig. 278). The bandage round the arm is then removed and the saline solution allowed to flow. The container must never be allowed to become empty, otherwise air may be injected into the veins. If, therefore, the container accidentally becomes empty, the tube should at once be pressed with the finger and thumb.

Termination of the Operation.—After sufficient fluid has been run in (and not more than 3 pints should as a rule be injected), the ligature fixing the cannula is cut, the cannula removed, and the third ligature is tightened. The wound is then closed by a couple of interrupted sutures, and a dry dressing is applied.

Points about the Operation.—The skin incision should be large enough to expose a good length of vein. The vein should be freed as well as exposed so that the operator can pick it up, and theother details of the operation being carefully followed no difficulty will be found in the intra-venous injection of saline solution. If the patient has lost much blood, the rate of flow of the saline solution may at

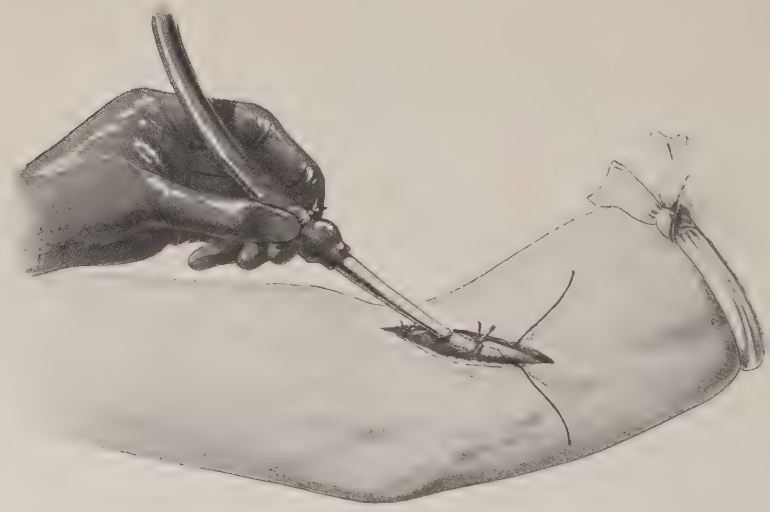


FIG. 278.—The Cannula tied in.

first be slow. An intra-venous injection should never be given in cases of hæmorrhage till the bleeding has stopped.

Rectal injection.

Instruments.—A glass funnel, a No. 12 indiarubber catheter, a receptacle to hold the solution, and a thermometer.

Injection.—The rectum will tolerate as a rule but 6 oz. of saline solution. Before the patient has recovered from the anæsthetic a pint or rather more can be injected.

By means of a 30-inch rectal tube a pint of saline solution can, if a very little force is used, be injected into the colon.

Continuous injection into the rectum may be effected by the apparatus described for subcutaneous injection, p. 505, a rectal tube being used in place of the needles.

CHAPTER XXXII.

Obstetric Operations (*continued*).

THE ARTIFICIAL TERMINATION OF PREGNANCY.

It may be necessary to terminate pregnancy before the child is viable or after, and the artificial methods employed may be conveniently discussed under *induction*, that is stimulating the uterus to expel its contents, or *operative evacuation*.

ARTIFICIAL TERMINATION OF PREGNANCY BEFORE VIABILITY OF THE CHILD.

INDICATIONS.

Diseased Conditions associated with Pregnancy.

Among the various diseases which are at times associated with pregnancy and which may demand its termination are cardiac and pulmonary disease, nephritis, and pyelitis, leukæmia, pernicious anæmia, Graves's disease, diabetes, chorea and insanity.

Such obstruction in the parturient canal that the birth of a viable child is impossible, as, for instance, marked degrees of pelvic deformity, fibroid tumours of the uterus, ovarian tumours, cancer of the cervix, and tumours or atresia of the vagina may justify the termination of pregnancy.

The most debatable cases amongst these are those in which the life of the patient will only be threatened at term on account of obstruction to delivery and in which she refuses to submit to Cæsarean section.

The point will then arise whether it is justifiable to terminate pregnancy before the child is viable. Such a question is very difficult to answer, and we are of opinion that each case must be judged on its own merits; for while, on the one hand, it would be wrong for the practitioner to aid and abet a woman who was relying upon her pelvic deformity to escape the responsibilities of maternity or the results of illicit intercourse; on the other hand it is entirely justifiable in cases where the obstruction is of such a degree that a refusal of Cæsarean section entails the performance of a very difficult and dangerous destructive operation on the child at term, such as would

inevitably be the case if the true conjugate measured less than 3 inches.

We think, too, that a woman who has already undergone one Cæsarean section for the sake of a living child is within her rights in refusing a second operation of this nature, although we consider that she would be best advised to have it performed and be sterilised at the same time.

Diseased Conditions due to Pregnancy.

Under this head fall the toxæmias of pregnancy, such as pernicious vomiting, jaundice, and rarely albuminuria; malpositions of the uterus, such as incarcerated retroverted uterus and prolapse; diseased conditions of the ovum, such as sepsis, carneous and hydatidiform moles, hydramnois, serious hæmorrhage due to partial separation of the ovum and dead fœtus.

METHODS.

Induction.—Rupture of the Membranes.—This is a slow method, and there is a liability for septic infection of the uterine contents to occur before the ovum is expelled. Such a method of induction increases the difficulty of operative evacuation later on should this be necessary.

Rupture of the membranes is usually indicated as an adjunct only to other methods of terminating pregnancy, as, for instance, plugging the vagina or inserting de Ribes' bag.

A purulent discharge from the genital passages contra-indicates the proceeding.

The patient is carefully prepared as follows: A vaginal douche of biniodide of mercury (1 in 4,000) should be given twice daily beforehand, and one also just before the operation. The vulva should be shaved and made as aseptic as possible. The instruments required, a Sim's speculum and uterine sound, should be boiled, and the operator should wear sterilised indiarubber gloves.

It is best to place the patient in the lithotomy position, but if she is not anæsthetised she may object, in which case she should be placed in Sim's semi-prone position. Sim's speculum having been inserted into the vagina the cervix is disclosed, the sound passed into the uterine cavity and the membranes ruptured.

Plugging the Vagina.—Plugging the vagina stimulates the uterus to contract, and the chief indication for its use is severe uterine hæmorrhage due to separation of the ovum.

Before the actual plugging, the bladder should be emptied, since when this method of induction is carried out efficiently retention of urine is apt to result from pressure on the urethra.

An antiseptic douche at 115° F. should also be given to wash out any blood clots that may be in the vagina, and by its heat to further stimulate the uterus to contract.

The vagina is tightly packed from the fornices downwards, after which a T bandage is applied, see p. 251.

The plugging must not be left *in situ* longer than twenty-four hours, and it is better to remove it within twelve hours, if necessary giving another douche and replugging.

Bougies.—This method is only suitable for pregnancy at the fifth month or later and is a slow method, taking about forty-eight hours or over. It is fully described on p. 719.

Bougies and de Ribes' Bag.—This method is a quicker than the preceding one. The bougies are removed in twenty-four hours, after which the smallest sized de Ribes' bag is inserted and the uterus is emptied in about thirty hours. This method is only feasible in pregnancy of five months' duration or over.

Fenton's Dilators and de Ribes' Bag.—This is the quickest method of inducing the uterus to expel its contents, and it generally takes about eight hours. It is only feasible with a uterus of five months or over.

Operative Evacuation.—Dilatation of the Cervix with Fenton's Dilators.—This method is the best for terminating pregnancy up to the fourth month, but after this period the head of the child may give trouble, and unless there is urgency induction may be preferable. The patient is suitably prepared by an aperient the night before and an enema in the morning, or if the case is urgent by an enema only. Antiseptic vaginal douches are given and the vulva shaved. The patient is anæsthetised.

The following instruments will be required: Clover's crutch, Auvard's or other vaginal speculum, a set of Fenton's dilators, two volsella, a uterine sound and an ovum forceps.

With the patient in the lithotomy position a douche of 1 in 2,000 biniodide of mercury is given, after which the cervix is rigidly held by means of the volsella.

The uterine sound is next passed to ascertain the length and direction of the uterine cavity, after which the dilators are inserted up to the largest size.

The vagina having been redouched, the operator passes the index finger of his right hand into the uterus (Fig. 279) and separates the ovum, being aided in this by pressing down the uterus per abdomen with his left hand (Fig. 280).

After the ovum has separated it is extracted piecemeal by the ovum forceps.

If the pregnancy has advanced to the fifth month it may be very difficult to evacuate the contents of the uterus quickly, as the head of the fœtus is apt to become detached, when its size

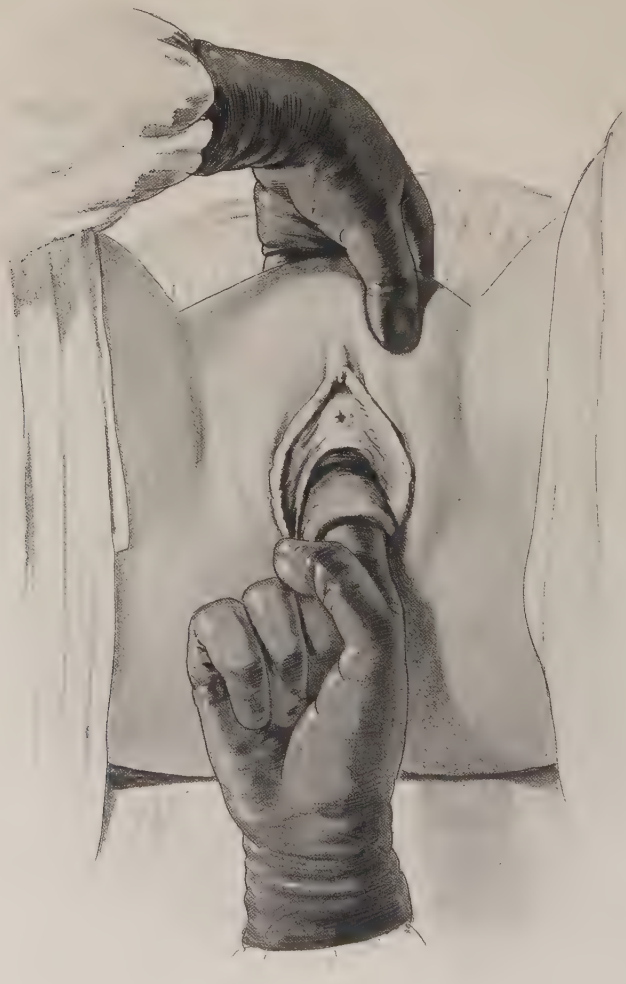


Fig. 279.—Digital Separation of the Ovum.

will form an obstacle to its delivery until it can be grasped in the ovum forceps and crushed, a step in the operation which sometimes causes much trouble.

It may be possible to obviate this difficulty by turning the fœtus and then, gently delivering its feet, body and arms, to steady

the trunk whilst the ovum forceps are applied to the head. If, however, the size of the head is such that further dilatation is required for its delivery, or if the bleeding is so severe that the uterus *must* forthwith be emptied, there are two methods now to be described which attain the desired end more rapidly:

Dilatation of the Cervix with a Screw Dilator.—This method of operative evacuation is suitable for cases of five months or over, since a larger degree of dilatation is obtained. It is especially

FIG. 280.—Evacuation of the Uterus in early Pregnancy. Digital Removal of the Ovum.

useful where the cervix is very rigid, or where there is dangerous bleeding. The method of using the screw dilator is described later, see p. 728.

Vaginal Cæsarean Section.—This is a suitable operation for five-months cases or over, in circumstances of urgency. It is an operation which requires surgical experience and necessitates trained assistants. It can be used as an alternative to the screw dilator. It is described on p. 700.

Manual Dilatation of the Cervix.—If the attendant has no

mechanical dilators to hand, and if the cervix is soft it may be possible to dilate the cervix with the fingers by the method shortly to be described.

ARTIFICIAL TERMINATION OF PREGNANCY AFTER VIABILITY OF THE CHILD.

The artificial termination of pregnancy during this period may be necessary either in the interest of the mother or of the child.

MATERNAL INDICATIONS.

Diseased Conditions associated with Pregnancy.

The various diseases mentioned under "Artificial Termination before Viability" may not endanger the mother's life until the child is viable.

Diseased Conditions due to Pregnancy.

The toxæmias of pregnancy already mentioned, especially albuminuria, which ensues nearly always after the twenty-eighth week.

Accidental and unavoidable hæmorrhage.

Diseased conditions of the ovum, such as rare cases of vesicular mole with a living fœtus, hydramnios, and dead fœtus.

FŒTAL INDICATIONS.

Contracted pelvis.

Large fœtus.

Habitual death of the fœtus before term.

Prolongation of pregnancy beyond full term.

Contracted Pelvis.—As the result of experience the following table is generally accepted as a working basis for the induction of premature labour in cases of flattened pelvis:

Size of True Conjugate.	
$2\frac{3}{4}$ inches	Labour to be induced at twenty-eighth week.
3 ,,	,, thirtieth ,,
$3\frac{1}{4}$,,	,, thirty-second ,,
$3\frac{1}{2}$,,	,, thirty-sixth ,,
$3\frac{3}{4}$,,	,, thirty-eighth ,,

If the pelvis is "generally contracted" labour must be induced earlier, therefore in the above table increase the true conjugate by a quarter of an inch.

Such a table, however, is an uncertain means of estimation, especially in the last weeks of pregnancy, since the exact period of

gestation connot be diagnosed and also the size of the fœtal head, which must be taken into account, varies most in the last weeks.

Having decided about the time at which labour should be induced, the patient is directed to present herself at least a fortnight prior to this in order that the relative size of the fœtal head and maternal pelvis may be estimated. The treatment will depend upon the result of this examination.

1. If the head cannot be pressed into the brim of the pelvis, labour should be induced at once; a better treatment would obviously be Cæsarean section.

2. If the head passes into the brim with difficulty, labour should be induced at once.

3. If the head can be pressed easily into the pelvic cavity, the induction may be postponed and the patient examined weekly till such time as the practitioner thinks fit to induce labour.

A good method of estimating the relative sizes of the fœtal head and maternal pelvis is that of Munro Kerr, and is as follows: The patient lies on her back and her abdomen is bared; the practitioner standing on her left side and facing her, passes two fingers of his left hand into the vagina and places the thumb of this hand above the pubes so that its point touches the head. At the same time the head is seized with the right hand and pressed down into the pelvic brim. By this manœuvre the consistency of the fœtal head and the degree of engagement can be determined by the internal fingers and the degree of overlapping can be determined by the thumb. It may be necessary to give the patient an anæsthetic to carry out this manipulation satisfactorily.

For other methods of estimating the size of the fœtal head, see p. 394.

In cases of contracted pelvis, the object of inducing labour should be the delivery of a child that has every prospect of surviving; this being so, the operation has marked limitations.

For pelves with a true conjugate of or below $3\frac{1}{4}$ inches,

Bar	reports a fœtal mortality of			53·3	per cent.
Pinard	,,	,,	,,	33·3	,,
Krönig	,,	,,	,,	57·4	,,
Leopold	,,	,,	,,	57·0	,,
Munro Kerr	,,	,,	,,	44·0	,,

These figures show that the induction of premature labour in pelves with a true conjugate under $3\frac{1}{4}$ inches with the object of delivering a child that will live is hardly justified. For all practical purposes, therefore, induction of premature labour in cases of

contracted pelvis should be limited to those in which the true conjugate measures between $3\frac{1}{4}$ and $3\frac{1}{2}$ inches, or if the period of pregnancy is reckoned, it is found that before the thirty-fourth week, and more especially before the thirty-second week, the chances of the child surviving its birth any length of time are remote.

With true conjugates above $3\frac{1}{2}$ inches, it is better, especially in a first pregnancy, to let the patient go to term, since the fœtal mortality is less under these conditions, for it must be remembered that many labours terminate normally with true conjugates between $3\frac{1}{2}$ and $4\frac{1}{4}$ inches, and that premature labour has particular disadvantages of its own, apart from the mere pelvic contraction.

In dealing with the foregoing figures it must, of course, be understood that the great object of inducing premature labour in cases of contracted pelvis is to obtain a child that can be reared. In the majority of patients with true conjugates below $3\frac{1}{4}$ inches, the children will be born alive, but most of them will either die soon after delivery or will not survive their birth longer than a year.

Large Fœtus.—Although it is impossible to accurately determine the size of the fœtus *in utero*, it has already been pointed out that this factor is one of great importance in determining the exact time at which premature labour should be induced. The practitioner, however, may be able to gain useful information from previous labours, so that with a history of difficult labour due to the large size of the fœtus and perhaps its death, induction of premature labour in a subsequent pregnancy is indicated, since the size of the fœtus tends to increase with each pregnancy, see also p. 414.

Habitual Death of the Fœtus.—The causes of this are not well known. Syphilis is certainly one and perhaps the commonest. The fœtus dies at about the same time in each pregnancy, and its life is at times preserved by inducing premature labour a short time previously to its expected death.

Prolongation of Pregnancy beyond Full Term.—Most of these supposed cases of post-maturity are due to inaccurate calculation. A few are genuine, and in these the child is often born dead or dies suddenly in a fit soon after delivery. When a practitioner is satisfied that pregnancy has progressed beyond its normal limits he should induce labour.

METHODS.

Induction.—Rupture of the Membranes.—This method is indicated in cases of hydramnios, and may be indicated in certain cases of accidental and unavoidable hæmorrhage and in eclampsia. As a

routine method it is unsatisfactory, since it abolishes the bag of membranes, thus increasing the risk to the child and the danger of sepsis.

Bougies.—The insertion of celluloid bougies is by far the best method when premature labour is being induced in the interests of the child, since the result more nearly approximates that of normal labour than in any other method. It should not be used if there is a purulent vaginal discharge from the genital passages. There are three drawbacks associated with this method:

1. It is at times very slow in action.
2. The membranes may be ruptured during the insertion of the bougie.
3. The placenta may be partly separated.

The lapse of time before labour is terminated varies within wide limits, since with some patients as many as six days may pass before the child is born, whilst with others it may be only a matter of a few hours. The average time is somewhere between twenty-four and seventy-two hours, according to the number of bougies inserted and whether labour is assisted by forceps or version when the cervix is dilated.

The patient is carefully prepared as for dilatation of the cervix, the vaginal douches being given for at least two days before the time selected for the operation. The bougies are rendered aseptic by placing them in biniodide of mercury (1 in 1,000) for twelve hours; the solution should be cold, so that in the summer it is useful to surround the basin containing it with a little ice. If the bougies become at all warm, they bend, and difficulty may be experienced in inserting them. The operation should be performed under an anæsthetic.

The patient having been anæsthetised and placed in the lithotomy position, an Auvard's or a Sim's speculum is inserted, and the cervix is gently seized with an ovum forceps, which is not so likely to tear it as a volsellum: a tear of the cervix in these cases often results in rather troublesome hæmorrhage. One, two, three, and, if possible, four bougies are then passed through the external os up the cervical canal; and their ends are pushed with the index finger right up into the uterus, so that they rest above the level of the internal os (Fig. 281). When used for inducing labour in the earlier months it may not be possible to push up the bougies as far as this. After the bougies have been inserted, the vagina is packed with tampons. If labour has not started in twenty-four hours, the tampons should be removed, the vagina douched, and if any of the bougies are found to have come down, these should be removed

and new ones inserted; if the bougies are still in position others can be inserted, and under such conditions we have inserted as many as eight bougies into the uterus before labour started. If in another twenty-four hours labour has not started, it is best to terminate the pregnancy by means of a de Ribes' bag, although if proper precautions are taken, the bougies may be left *in situ* for several days without any danger.

Complications during the Introduction.—The membranes may be ruptured during the passage of the bougie; this can best be obviated by only using very little force. It is better to let the

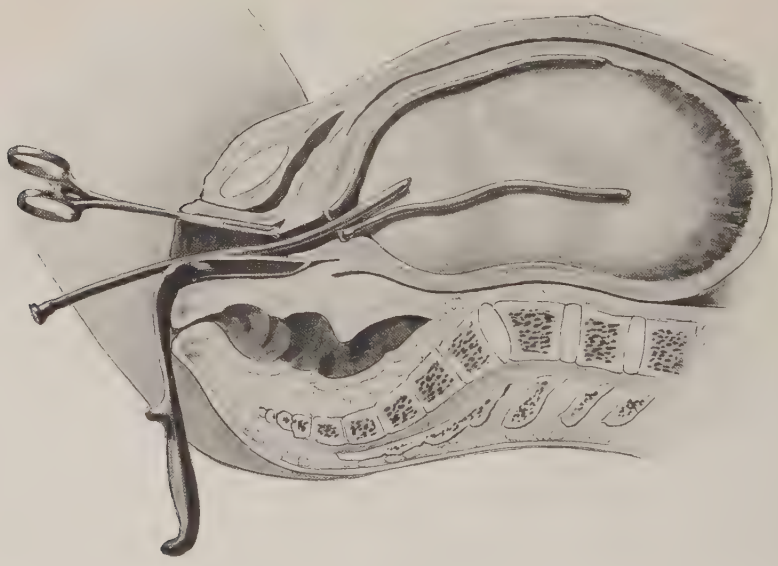


FIG. 281.—Induction of Premature Labour. Insertion of the Bougies.

bougie glide in whichever way it will, and avoid pushing it up along the posterior wall of the uterus, although as a rule, this is the direction it takes. If the membranes are ruptured, it is best to finish the induction by inserting a de Ribes' bag.

The placenta may be separated and serious bleeding result. As a rule, the placenta is sufficiently firmly attached to act as a buffer to the bougie, and when one can feel some obstruction to its passage, one withdraws the bougie and tries some other direction. It is rare for the placenta to be separated; if it is, the hæmorrhage may be very smart, but ceases when the vagina is plugged.

The presenting part may obstruct the point of the bougie. In this case the index finger of the right hand should be inserted

into the cervical canal, and the cervix then be pulled away from the obstruction.

If for some reason it is impossible or inadvisable to give an anæsthetic, the bougies may be introduced without its assistance. It is a rather more difficult method for one not accustomed to performing the operation.

The most comfortable method for the patient is to place her in the left lateral position, and then with the right index finger at the external os, the bougie is held in the left hand and guided through the cervical canal.

If the operator is inexperienced and the patient very tolerant, the cervix may, as already described, be seized with the aid of the ovum forceps and a Sim's speculum preparatory to introducing the bougie.

Bougies and de Ribes' Bag.—This method is also an excellent one and is quicker than by the bougie alone. The bougies having been left in for twenty-four hours are removed, the vagina well douched with biniodide of mercury (1 in 2,000), and de Ribes' bag then introduced.

Labour follows in from four to eight hours, and is completed on the average within thirty hours of the bougies being inserted.

Fenton's Dilators and de Ribes' Bag.—This is the quickest method of inducing labour. The cervix is dilated up to No. 26 Fenton, and the bag is then inserted, labour follows in about six hours.

Remarks on de Ribes' Bag.—The method of delivery induced by de Ribes' bag approaches very nearly that of the normal. It is, therefore, a good method when the interests of the child are under consideration, for until the bag is expelled pressure on the child is prevented, and when it is expelled the cervical canal is large enough to allow of immediate delivery.

When used for placenta prævia it has the additional advantage of pressing on the separated placenta and so controlling the hæmorrhage.

It is the quickest method of induction, and is therefore suitable for cases of urgency, as, for instance, threatened eclampsia.

Disadvantages.—Though an extremely useful instrument de Ribes' bag has certain drawbacks which may be shortly discussed.

1. When compared with some of the more forcible methods of inducing premature labour, de Ribes' bag is slow; but if traction is applied to the bag by means of a 2-lb. weight tied on to its end, the length of time occupied in dilating the cervical canal is very materially shortened. There is, however, a disadvantage in attaching a weight, namely, that the bag may be pulled through the

cervical canal before labour pains have begun, in which case it will immediately contract up again.

2. The bag may burst, but if it has been properly cleansed and filled with a sterilised solution this will not increase the risk to the patient.

3. The instrument, as well as being liable to burst, is very likely to leak if it has been put away in a crumpled up state for some considerable time beforehand. When not in use it should be kept inflated and should always be tested before being inserted.

4. The bag may displace the presenting part. This is not such

FIG. 282.—Induction of Premature Labour. Insertion of de Ribes' Bag.

a serious drawback as might be supposed, since, with full dilatation of the cervical canal, any malposition can be rectified on expulsion of the bag.

5. The bag has ruptured the lower segment of the uterus. This is, of course, a very serious complication, and did it occur comparatively often this fact would contra-indicate its further use. It is, however, a very rare complication, and has occurred generally in cases of placenta prævia, when the lower uterine segment is more liable to rupture.

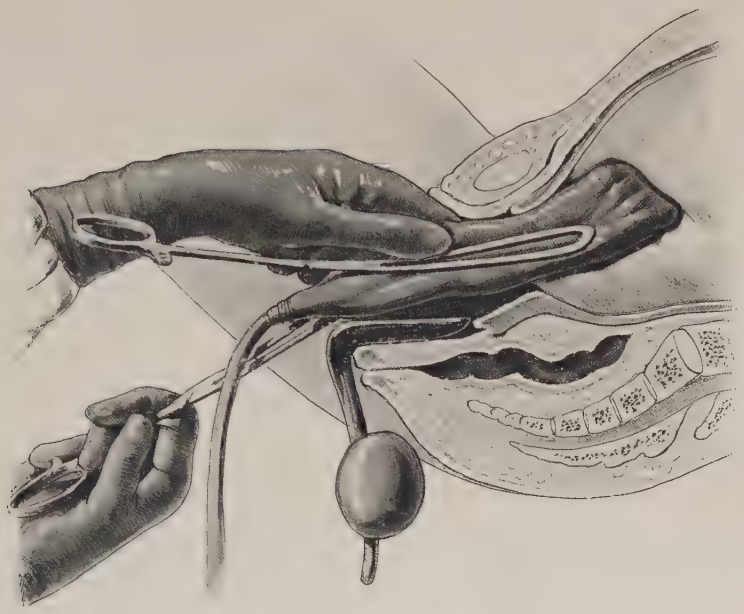


FIG. 283.—Induction of Premature Labour. Removing the Forceps.

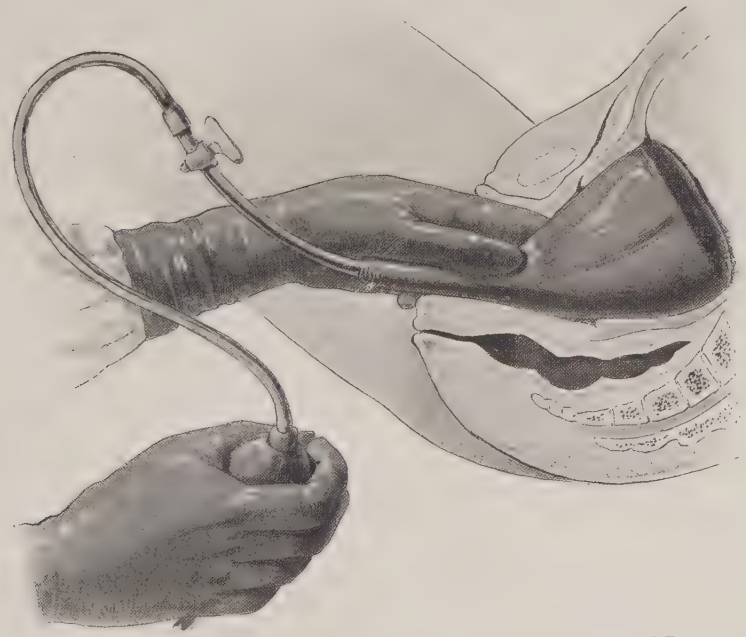


FIG. 284.—Induction of Premature Labour. Filling de Ribes' Bag.

Method of Insertion.— The bag is made sterile by boiling, or by insertion in 1 in 20 carbolic acid for some hours, as boiling tends to injure it. Sterilised water should be used to expand it, and its capacity is best tested by filling it with the sterilised water, and then pouring the water back into a sterilised vessel, when the correct quantity is at hand and can be used after the bag has been introduced.

It is easier to pass de Ribes' bag when the patient is under the influence of an anæsthetic, though this can be dispensed with in many cases if the patient is at all tolerant and the cervical canal large enough.

The patient is prepared as for dilatation of the cervix. The cervix is steadied if possible with an ovum forceps, but if the uterus cannot be held sufficiently firm with this instrument, a volsellum must be used. The bag is rolled up and introduced by means of a special pair of forceps sold with it (Fig. 282). When the bulk of the bag has been carried past the internal os, the blades of the forceps are "sprung" but not removed, and a little of the sterilised water is now run in by means of an irrigating apparatus or syringe. After a few ounces have been introduced the blades of the forceps can be removed (Fig. 283). By leaving the blades of the forceps *in situ* whilst the first few ounces of water are being run in, the bag will be prevented from slipping through the cervical canal into the vagina, a troublesome complication which is apt to occur if the forceps are removed before any water is introduced. The remainder of the water is then run in (Fig. 284), the tap is turned, and the indiarubber tube bent on itself and tied with a piece of tape (Fig. 285). This prevents leakage at the tap when the pressure of the fluid in the bag is raised by the uterine pains, a likely result even with a new bag, and it will also prevent the water running out if the tap is accidentally turned whilst the bag is in the uterus. The position of the bag should be examined from time to time.

The Position of de Ribes' Bag when in the Uterus.—The bag can be made to occupy one of two positions, either between the membranes and the uterine wall, in which case the membranes are not ruptured, or inside the amniotic cavity, in which case the membranes are ruptured as the bag is introduced.

Which of these two positions the bag should occupy depends upon what it is being used for. If to arrest bleeding in cases of placenta prævia, the bag should be passed through the membranes into the amniotic cavity, otherwise by the time the bag is fully distended and before the pressure is applied to the placenta an

additional and unnecessary amount of placenta will have been detached.

In all other cases the bag is best used by passing it between the membranes and the uterine wall.

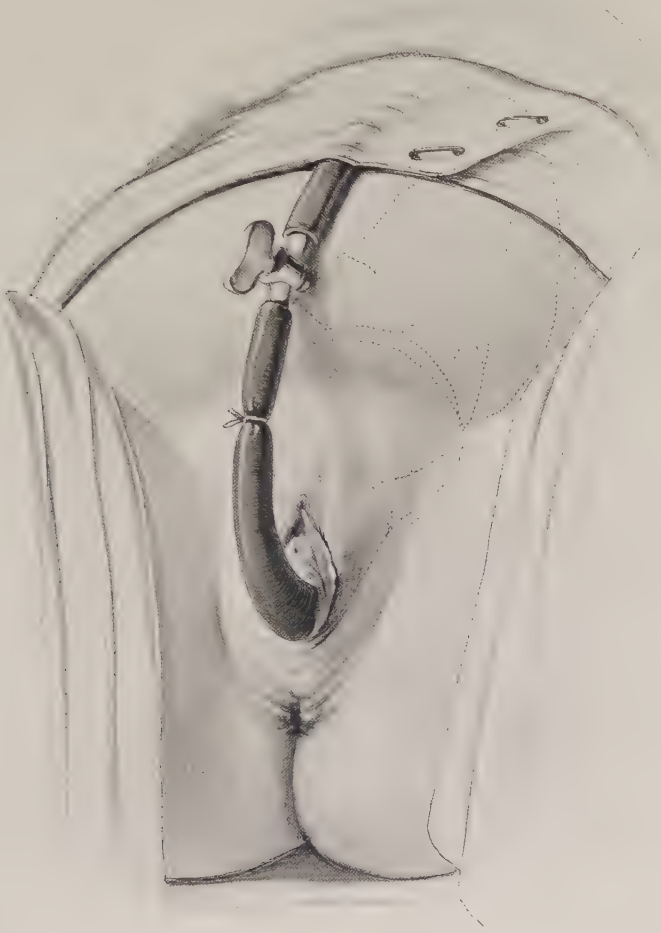


Fig. 285.—Induction of Premature Labour. De Ribes' Bag *in situ*.

When the bag is expelled into the vagina the water is run off, the bag removed, and the labour terminated in whichever way may be deemed best.

Operative Evacuation.—The operative evacuation of the uterus, as a means of artificial delivery after the child is viable, presupposes

that there is some urgent reason to terminate the pregnancy as soon as possible.

The occasions on which such treatment may be necessary are of course few, and are concerned with the preservation of the mother's life rather than that of the child, since most of the diseases for which forcible delivery is undertaken are in themselves so dangerous to the life of the child, that it is nearly certain to be dead or to

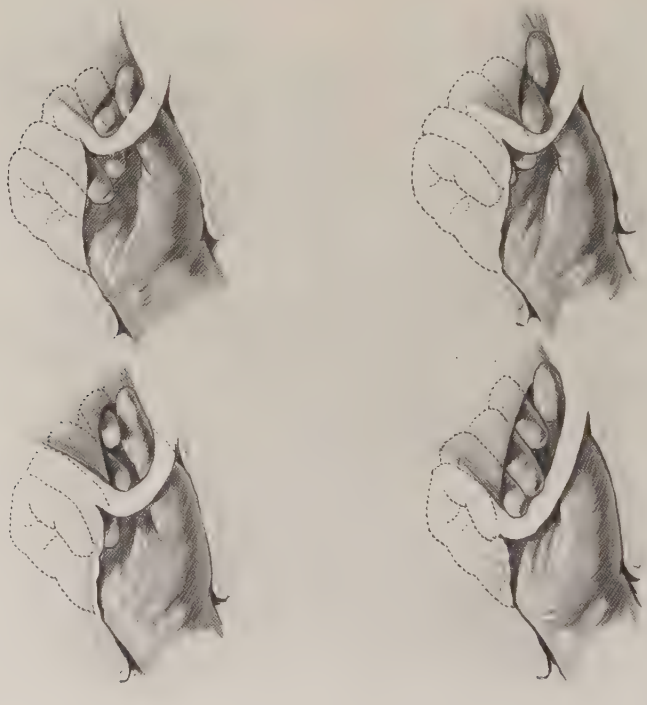


Fig. 286.—Digital Dilatation of the Cervix. Early Stages.

quickly succumb, apart from the fact that the child may be killed during the extraction.

Digital Dilatation and Version.—This is rather a fatiguing method, since it will often take well over the hour to accomplish.

As a means of dilatation it has the advantage that the operator can estimate more accurately what is taking place than he can with the other methods of forcible dilatation.

With the patient anæsthetised and properly prepared, the operator passes the index finger of his right hand if the patient is on her back, or left hand if she is on her left side, gently up the cervical

canal. If the external os is not large enough to admit the finger, it must first be dilated with a few sizes of ordinary metal dilators. When the index finger has been passed into the uterus, it is withdrawn and reinserted, this time with the thumb; the internal os is then enlarged by a movement somewhat corresponding to that of "rolling" a cigarette, and as the canal enlarges, the second finger is introduced by the side of the others and a similar movement carried out, and so until the thumb and all the fingers have been introduced, and when these are separated the os will be fully dilated

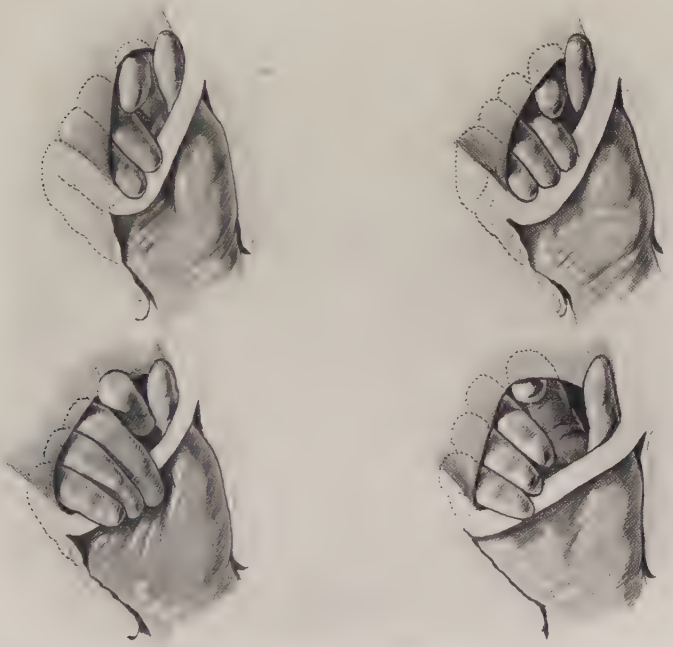


Fig. 287.—Digital Dilatation of the Cervix. Later Stages.

(Harris) (Figs. 286, 287). The cervical canal can be digitally dilated by another method, in which the index finger of each hand is inserted through the os and forcibly abducted, and when the canal is large enough two fingers of each hand are inserted and the cervical canal further stretched (Bonnaire).

The strictest antiseptic precautions should be taken when digitally dilating the cervix, and the operator should wear sterilised rubber gloves.

The stretching must be done carefully, for there is a danger of the cervix and lower uterine segment being torn.

It is a suitable method when the cervix is soft and the child considerably premature. When the cervix is dilated the child is delivered by version.

Screw Dilatation followed by Version of Forceps.—There are various patterns of screw dilators on the market, the two best are Bossi's (Fig. 288) and De Seigneux's. They differ principally in the fact that whereas Bossi's instrument dilates the cervical canal in an oblique plane and so increases the risk of lacerating the posterior wall of the cervix with its posterior blade, a complication common with this

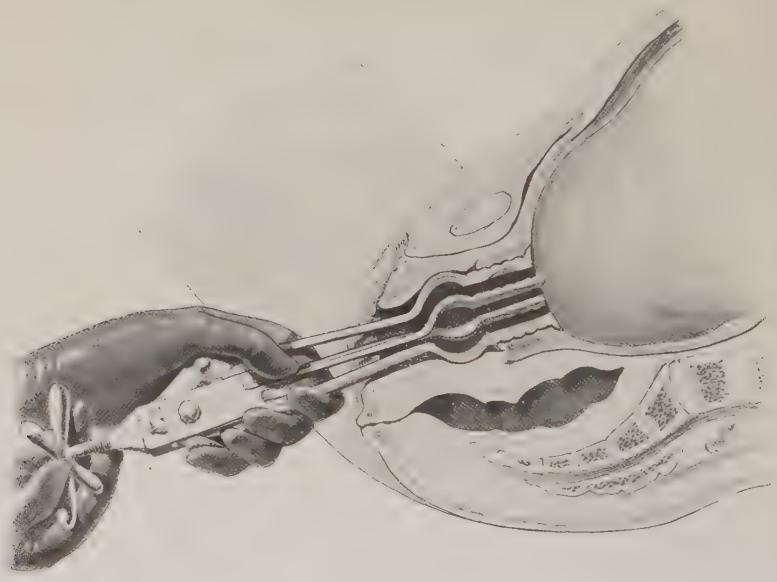


Fig. 288.—Bossi's Dilator.

variety of instrument, De Seigneux's instrument dilates the canal in the coronal plane and so obviates this risk.

The method of using both of these instruments is the same. With the patient under an anæsthetic and in the lithotomy position, the instrument is passed with all antiseptic precautions through the external os and its handle is depressed against the perineum.

The cervical canal is then dilated very gradually by turning the handle of the instrument in the intervals between the pains about 1 centimetre every four minutes, and as the instrument dilates to 10 centimetres (4 inches) it takes about forty minutes to fully dilate the cervix, the operator being guided as to how long he should take by the condition of the cervix, which must be palpated with the

index finger to see that it is not too tense. Directly the canal is large enough to take the ends of the blades covered with their metal caps, the instrument should be withdrawn and the caps applied, since they make the ends of the blades much broader and therefore less likely to lacerate the cervix.

By means of such an instrument, the cervix can be dilated more rapidly than by any other method, the time varying with different individuals, whether labour has started or not, whether the patient is a primigravida or a multigravida, and whether the cervical canal is obliterated or not.

Screw dilatation is best suited to cervices which are soft.

Dangers.—This method of dilating the cervix is not much in vogue, partly because it demands a special instrument which will but rarely be required, and partly because of the danger of laceration associated with its use. The danger of severely lacerating the cervix is a very real one, but can be guarded against to a certain extent as follows :

The dilatation should be carried out very slowly.

The handle should never be turned during a pain.

Care must be taken to prevent the ends of the blades slipping out of the cervical canal.

The instrument is best used only during labour, and when the cervical canal is obliterated, so that there is only the external os to dilate. If it is used before the cervical canal is obliterated, the risk of laceration will be greatly enhanced, and the operator must be certain that the ends of the blades project well above the internal os.

Vaginal Cæsarean Section.—In this operation the cervix and a part of the lower uterine-segment are divided, by which means the uterus can be emptied in a few minutes. The technique is described on p. 700.

This operation has not been received with much favour in this country, perhaps because the opportunities warranting its performance are so few and far between, so that but few operators have had sufficient cases upon which to form any reliable conclusions.

Munro Kerr, who has had some experience, thinks highly of the operation when performed during the first five or six months of pregnancy, but not later. Durnhssen who invented the operation, reports 201 cases with 28 deaths (13·9 per cent.), fifteen of the patients who died having severe eclampsia ; of the thirteen remaining, the death of ten was stated to be from causes other than the operation.

Vaginal Cæsarean section, as a means of inducing premature labour, has been used in cases of eclampsia, accidental hæmorrhage, carcinoma of the cervix, and rigidity of the cervix, when expanding metal dilators were not available, were not indicated, or could not be used.

If the operation is performed towards the end of pregnancy, it may be necessary, in order to obtain enough room to deliver the child, to divide the posterior cervical and vaginal walls, as well as the anterior cervical wall.

Vaginal Cæsarean section is an operation that should only be performed when the help of trained assistance is available, and the surroundings are such as to reduce the risk of sepsis to a minimum.

Difficulty.—The operation is rendered difficult by a small vagina such as may be found in a primigravida. In such a case it may be necessary to make a deep perineal incision through the vagina and levator ani to obtain sufficient room.

Abdominal Cæsarean Section.—The indications and technique for this operation have already been discussed, see p. 658.

Concluding Remarks on the Artificial Termination of Pregnancy.—In general it may be said that up to the fifth month operative evacuation is the best method. After this period, however, the increased size of the child makes the operation more dangerous for the mother than induction of labour. After the twenty-eighth week the life of the child has also to be taken into account, so that from this period onwards induction is always to be preferred to operative evacuation, unless immediate delivery is necessary for the sake of the mother.

The practitioner must be most careful never to artificially terminate pregnancy before viability without having a consultation with another medical man, except in cases of extreme urgency.

CHAPTER XXXIII

Diseases and Injuries of the Newborn Child.[1]

INTRA-UTERINE DEATH OF THE CHILD.

CAUSE.

For most of the causes of intra-uterine death of the child, the reader is referred to the causes of miscarriage enumerated upon p. 219. As a rule some very definite cause can be determined either by examination of the child or afterbirth, or by a knowledge of the mother's condition. Occasionally a woman may in the latter half of her pregnancy give birth to a dead child, and this may be repeated in succeeding pregnancies, and the complication is known as that of "habitual death" of the child. In most of these cases a careful examination will show the cause to be syphilis, and more rarely renal disease of the mother; in a very few no cause can be established.

SYMPTOMS AND SIGNS.

The symptoms and signs will depend a good deal upon when the child died, and for this purpose we may roughly divide the pregnancy into two parts, the first five months and the last five months.

First Five Months.---The principal symptoms and signs of pregnancy during this period are concerned with morning sickness and the enlargement of the uterus and breasts. If, therefore, morning sickness ceases, the breasts gradually resume their usual size previously, and the uterus stops increasing in size, the child may be said to be dead. Seeing, however, that morning sickness is not always present, and that the enlargement of the breasts does not always occur, the cessation of uterine enlargement is the only sign of real value, and to be sure of this, repeated examination is necessary over a period of two or three weeks at least, whilst it must be remembered that vesicular mole often causes an enlargement of the uterus greater than normal. If there is an offensive, brownish discharge coming from the uterus the child will be dead.

Last Five Months.—During the last five months there are certain signs which make the presence of a live child practically certain: they are its movements and its heart sounds. The fact that the mother no longer feels the movements of the child must not be allowed to influence the diagnosis too much, as mistakes in this

[1] For many of the facts concerned with the rare diseases of the child to be described we are indebted to "Ante-natal Pathology and Hygiene of the Fœtus," by T. W. Ballantyne, 1902 (William Green and Sons).

respect are so common, but more weight in this respect may be given to the opinion of multigravidæ. If, however, the practitioner has heard the child's heart, and yet on repeated examination afterwards fails to detect it, a diagnosis of death of the child will certainly be justified. As in the first five months there will be retrograde changes in the breasts, and further, in some cases, colostrum or milk is secreted for a few days before such changes become manifest. If the mother thinks her child is dead she may complain of feeling ill, depressed, and of a cold weight in the abdomen; but although as a rule these symptoms are purely of nervous origin, occasionally her health does deteriorate, and markedly so in cases where there is intra-uterine sepsis.

Another almost certain sign is that the uterus does not enlarge, although in a case of hydramnios when the child is dead the enlargement may continue.

DIAGNOSIS.

The diagnosis of the child's death will mostly be arrived at from the symptoms and signs already given. As in the majority of cases such diagnosis will depend upon the size of the uterus, it is well to remember that a woman can become pregnant during a period of amenhorrhœa. If, for instance, having missed two periods she became pregnant, a threatened miscarriage at the end of the first month's pregnancy might lead to a local examination, when the fact that the size of the uterus only corresponded with a one-month's gestation, whereas there had been three months' amenorrhœa, might lead to a mistaken diagnosis on the part of the practitioner. In a similar case without a threatened miscarriage the woman expecting abdominal enlargement and fœtal movements when she had missed five periods (whereas she was really only two months pregnant) might seek advice on the supposition that the child was dead. Again, as already mentioned, the uterus, although the child is dead, may continue to enlarge with vesicular mole or hydramnios.

If the cervical canal will admit the finger and the skull can be felt, there is one certain sign that the child is dead, and that is separation of the bones of the skull, which can be felt loose under the skin, and if the uterus will admit the fingers or hand sufficiently to feel the umbilical cord, then absence of its pulsation would be a further certain indication.

RESULTS.

The results of the death of the child will depend upon whether the membranes remain intact or not.

Membranes Ruptured.—If the liquor amnii escapes, even in small

quantities, the amniotic cavity may become infected, putrefaction result, and the condition of the mother becoming serious, the ovum is expelled or has to be removed forthwith.

Membranes Intact.—If the membranes are not ruptured and the child dies in the earlier months it may become absorbed, or the ovum being converted into a carneous mole may remain *in utero* for many months, eventually being expelled. From the third month onward death of the child may be followed by its maceration, mummification, saponification or calcification.

Maceration.—This, the commonest change taking place in the dead fœtus, leads to the disintegration of the various parts of the child, together with swelling of its tissues.

Mummification.—In this case the liquor amnii is absorbed together with much of the tissues of the body, so that the child is dry and has the appearance of a mummy. This change is more particularly associated with twin pregnancy, the dead child being flattened out by the other into a structure known as a "fœtal papyraceus."

Saponification.—In this case the child becomes converted into a mass of soapy or fatty material termed adipocere. It is a phenomenon of extra-uterine gestation.

Calcification.—In this case lime salts are deposited in the tissues of the child, and the condition is known as a lithopædion. It is seen in extra-uterine gestation.

Missed Abortion.—As a rule on the death of the child it is expelled within a short time, but it may be retained within the uterus for months. In this case the condition is known as one of "missed abortion." This phenomenon is very rare, and in any particular case the practitioner must be most careful to exclude an interstitial gestation which has ruptured into the uterus before making such a diagnosis.

Missed Labour.—"Missed labour" is a term often confused with and used as an alternative to missed abortion.

Missed labour is properly that variety of extra-uterine gestation which goes to term, the mother then passing through a false labour, and the child dying and afterwards becoming converted into a mummy, adipocere or a lithopædion.

TREATMENT.

In the early months, unless there is any very definite indication to empty the uterus, such as sepsis or hæmorrhage, the patient may be allowed to expel the defunct ovum without any extraneous aid.

From the fourth month onwards, in cases of "missed abortion," the cervix should be dilated and the uterus forthwith emptied. In the case of "habitual death of the child" after the twenty-eighth

week of pregnancy, without any discoverable cause, labour may be successfully induced shortly before the usual time of its death, and the child reared.

The practitioner should bear in mind, however, that in most of these cases the cause is syphilis, and should treat the father and mother accordingly, see p. 147.

ASPHYXIA NEONATORUM.

"Blue Asphyxia."

CAUSE.

"Blue asphyxia" is the result of deficient oxygenation of the blood of the child.

As such it may be due to pressure upon the placenta following an early rupture of the membranes, or associated with prolonged or precipitate labour, or premature separation of the placenta, or pressure upon the cord. Abnormality of the trachea, bronchi or lungs, whereby the latter are unable or tardy in taking over the respiratory function after the birth of the child, or congenital deformity of the heart, are also causes.

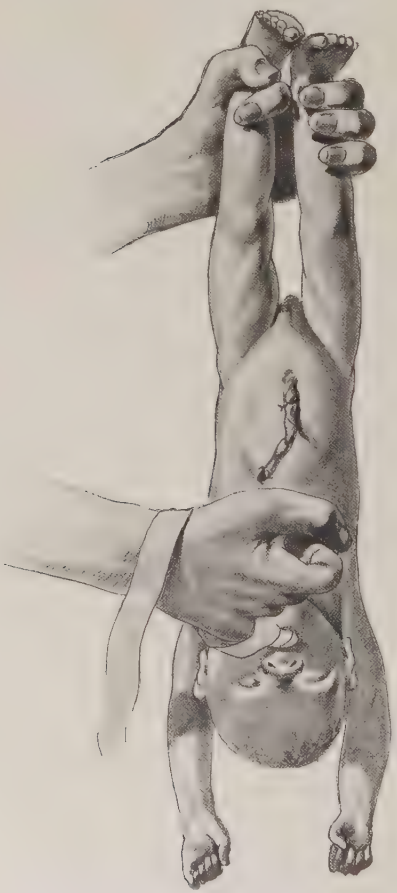


FIG. 289.—Clearing the Child's Mouth.

It may also be due to pressure on the cord, the head having been born, or to premature respiration in a breech delivery before the head is expelled.

In by far the greater number of cases obstruction to the circulation through the umbilical cord is the cause of blue asphyxia. It is, therefore, most commonly seen after breech delivery, after head delivery with the cord round the neck, and as the result of prolapse of the cord by the side of the head.

In blue asphyxia the heart is beating strongly and the limbs are tonic, but the child either does not breathe, or breathing is unable to draw air into its lungs.

PROGNOSIS.

Most cases of blue asphyxia recover with appropriate treatment. Where some grave obstruction to the air passages or defect in the cardiac mechanism exists the child will die.

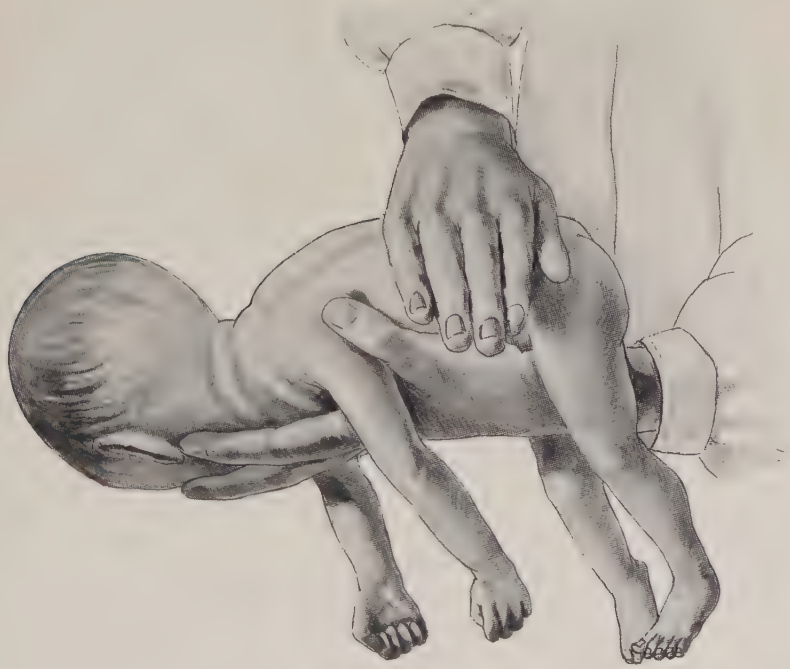


FIG. 290.—Eliciting the "Crying Reflex."

TREATMENT.

The child should be held upside down by its heels to allow of insucked blood, mucus, or liquor amnii escaping, and the mouth should be wiped out in this position (Fig. 289).

The buttocks should be smartly slapped, and if this fails to induce respiration, the lumbo-sacral spine should be briskly rubbed. There undoubtedly exists a "crying reflex" in this situation (Fig. 290).

The alternate placing of the child in baths of 105° F. and 60° F. is recommended by many.

If these means do not succeed resort should be had to artificial respiration.

Sylvester's Method.—The child is placed upon its back, with a

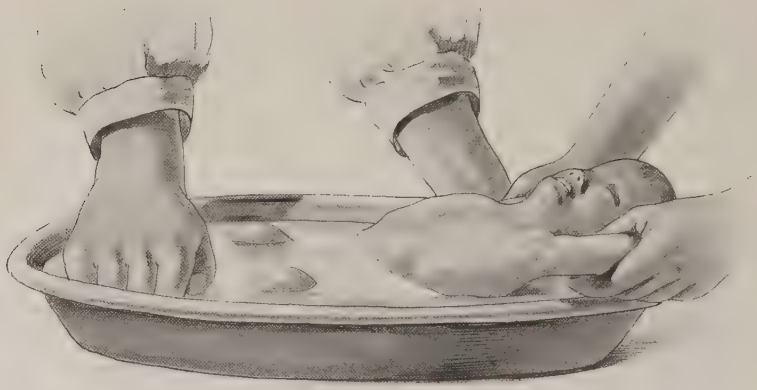


FIG. 291.—Artificial Respiration. Sylvester's Method in a Warm Bath: Inspiration.

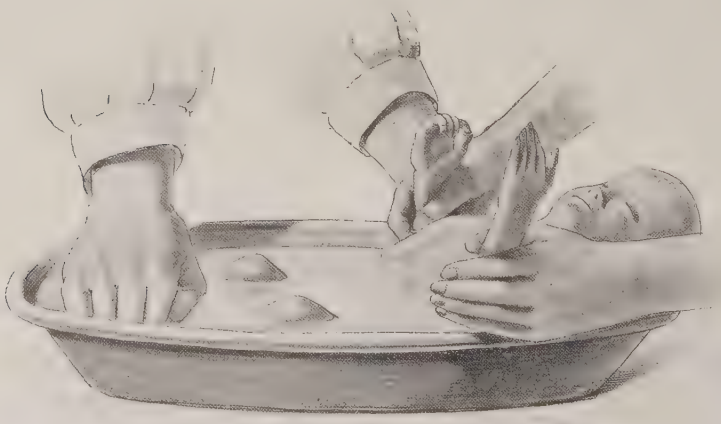


FIG. 292.—Artificial Respiration. Sylvester's Method in a Warm Bath: Expiration.

towel under its neck so that its head is slightly extended. An assistant is directed to steady the child by holding its feet, and the

child's elbows are then drawn upwards and outwards and then inwards until the arms touch the sides of the head. By this movement the chest is expanded and air is sucked into the lungs. After a slight interval the elbows are brought down and pressed against the chest, by which movement the air is driven out of the lungs. This manœuvre must not be repeated more than twenty times a

Fig. 293.—Artificial Respiration: Inspiration.

Fig. 294.—Artificial Respiration Expiration.

minute, and if attempts at respiration are made by the child, the movements of the operator should be timed to correspond with these. This method is well carried out in a warm bath (Fig. 291, 292).

Schultze's Method.—The child is held so that the thumbs of the operator are in front of its chest and over the clavicles whilst his fingers are at the back of its chest over the scapulæ; the legs hang

down, and the trunk is thus extended (Fig. 293). The operator then raises his arms so that the buttocks of the child are turned upwards till its trunk becomes flexed and the thorax is pressed upon by its pelvis and legs, by which movement the air is driven out of the lungs (Fig. 294). The operator then lowers his arms, and the trunk of the child becoming extended, air is drawn into the lungs.

This movement should be performed twenty times a minute, and the operator should first carefully dry the body of the child, otherwise there is a danger of its slipping out of his hands.

Byrd's Method.—Byrd describes his method as follows: Bring

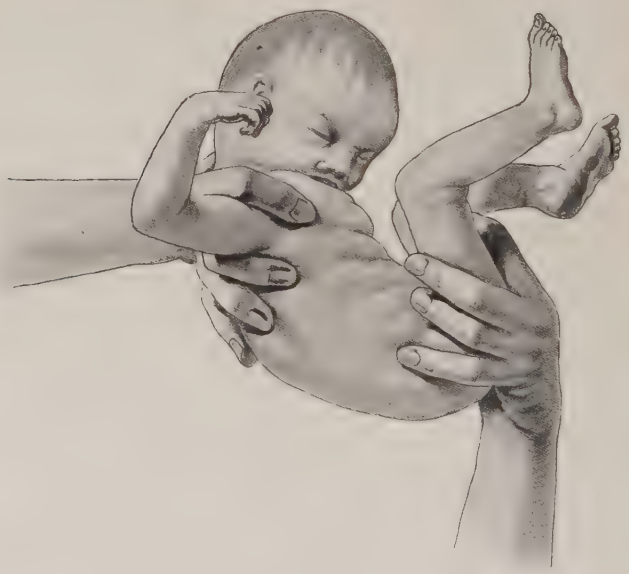


FIG. 295.—Byrd's Method of Artificial Respiration.

the ulnar sides of the hands together with the palmar surfaces looking vertically, then prop them beneath the back of the infant so that the extended thumbs may aid as far as possible in sustaining the vertex and inferior extremities (Fig. 295). Keeping the ulnar borders of the hand in contact so as to form a fulcrum, the radial borders or sides are simultaneously depressed to as great an extent as practical, say 45 degrees, below the horizontal line and then gradually elevated or pronated as many degrees above that line, thus facilitating the escape of air drawn into the lungs during the downward movement of the head and chest (Fig. 296).

The advantage of Schultze's and Byrd's methods is that they can

be performed without assistance, of Sylvester's that it can be performed in a hot bath.

Of the methods prescribed we prefer Sylvester's. If, when performing it, it is noticed that in making the movement of inspiration the ribs and sternum are insucked, tracheal or bronchial obstruction is indicated, and an attempt should be made to clear these passages by inversion, wiping out the pharynx or endeavouring to suck up fluid previously inhaled into the trachea by a soft rubber catheter passed through the glottis, and if the latter is successful the lungs may be directly inflated by blowing through the catheter.

The introduction of a catheter through an infant's glottis is,

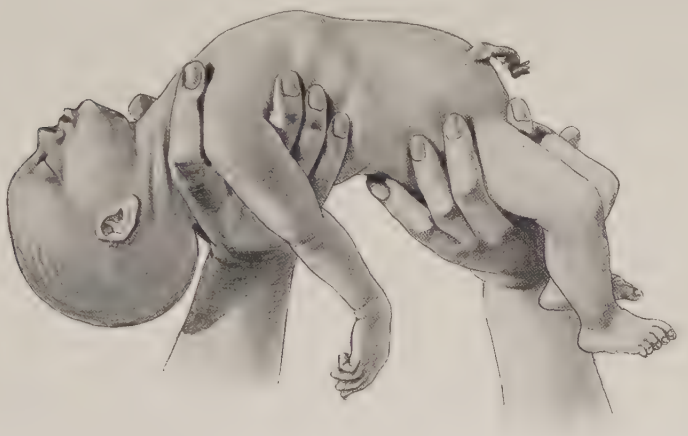


Fig. 296.—Byrd's Method of Artificial Respiration.

however, a difficult matter, it being much more apt to pass down the œsophagus.

Artificial respiration should be persisted in until the child either cries or dies.

"White Asphyxia."

CAUSE.

This is a condition of "birth-shock" produced by the pressure to which the child has been subjected. It is therefore seen after difficult labour, particularly that due to contracted pelvis, when forceps have been used. Children dying of "white asphyxia" exhibit in many instances post-mortem signs of cranial and cerebral injury.

The child is pallid, limp and flaccid, the heart is beating slowly

and irregularly, and respiration is either absent altogether, or occurs at irregular intervals in feeble gasps.

PROGNOSIS.

The outlook is much worse than in blue asphyxia. Many of the children die shortly after birth, others partly revive, but succumb in a few hours. In others recovery is followed by convulsions from cerebral injury.

TREATMENT.

A white asphyxiated child, after rapidly wiping out the mouth and throat, should be placed in a bath of 105° F. Five drops of brandy should be poured down its throat, and the body frictioned by the hand wetted with the same stimulant. In particular the lumbo-sacral "crying reflex" should be stimulated by friction in this situation. Rubbing the lips with the hand or a cloth after the manner of anæsthetists is also useful.

Artificial respiration by Sylvester's method should be carried out in the warm bath so long as the heart is beating.

In these cases, if the practitioner can succeed in rubbing a glow into the pallid skin, the child will probably recover.

Violent methods of restoration, such as slapping the child, the cold bath, or Schultz's method of artificial respiration, are contra-indicated.

SKIN DISEASES.

Alopecia.

This condition is due to arrested development of the hair follicles. It is a rare disease and may be either temporary, so that the baby remains for months or even years without any hair on the body, or the condition may even be permanent. It is associated with defective dentition and malformation of the nails.

TREATMENT.

Stimulating applications to the head and eyebrows and the internal administration of thyroid extract or anti-syphilitic remedies may be at times successful.

Hypertrichosis.

The presence of an excessive growth of hair all over the body at birth is a rare and very disfiguring affliction; a localised hypertrichosis is not so rare, but most of the cases that are classified as such are in reality cases of hairy nævus.

TREATMENT.

"Missing links," "dog-faced children," etc., the names given to this condition when it is universal, have to put up with their affliction. In some instances electricity and the Röntgen rays have been successfully applied for the localised form.

Fœtal Icthyosis.

This very rare skin disease may be either slight or severe.

In the slight form the body is covered with a continuous and shiny layer of thickened epidermis, with an appearance that has given origin to the name of "collodion fœtus." There are cracks and fissures in the horny covering, but these are only superficial, and rarely there is some ectropion of the mouth, eyelids and anus.

As a rule the child lives, and in a few cases the epidermis is shed and the child is cured; mostly the disease remains permanent.

In the severe form the body is covered with thick, yellow, horny plates separated by deep reddish-blue cracks with an appearance that led Bland-Sutton to describe it as a "Harlequin fœtus." There is marked ectropion of the eyelids, mouth and anus; the ears, nose, feet, and hands are also deformed, and the fingers are like birds' claws. All the children die within a few hours or days, being unable to suck or take nourishment.

TREATMENT.

There is no treatment for either form.

Fœtal Keratolysis.

The name given by Ballantyne to a "state of abnormal looseness of attachment or of actual desquamation of the epidermis of the living fœtus." It occurs sometimes in the absence of ante-natal syphilis or of the desquamative exanthemata; it may also occur when these have been present. At times it is associated with general anasarca, and it may be a sign of fœtal pemphigus or of post-maturity.

The desquamation is mostly localised, but it may be universal. The disease is not necessarily fatal.

TREATMENT.

The areas from which the epidermis has separated must be protected by ointment and cotton-wool.

Keratolysis Neonatorum (Ritter's Disease).

In this disease there is a desquamation of the skin after the birth of the child, which is really an exaggeration of what usually

takes place. The disease commences with dryness of the skin; this passes on to an exudative and red change, to be in its turn followed by a redrying, desquamation, formation of a new epidermis and disappearance of the redness. Later the body may be afflicted with boils and eczema.

As a rule the children live; in some cases death is due to diarrhœa or pneumonia.

Pemphigus Neonatorum.

Pemphigus in the new-born is generally due to syphilis; it may be due to sepsis.

The syphilitic lesions consist of large blebs full of blood or pus, and appear more especially on the soles of the feet and the palms of the hands. When the blebs burst their place is taken by small ulcers.

An epidemic of the septic form has lately been described by Wanklyn and Macrory. Fifteen children were affected apparently by infection from a sore on the finger of the midwife who delivered them. Streptococci were isolated from the lesions.

Sclerema Neonatorum.

This is a very serious disease, in which the subcutaneous tissue becomes indurated and the body temperature lowered. The children affected do not survive.

Lichen.

In this skin disease the body is covered with a number of small red spots, and a careless examination might lead to a mistaken diagnosis of scarlet fever.

As the condition is due to digestive troubles associated with perspiration, the child must be treated for these conditions.

SEPTIC DISEASE OF THE NEWBORN.

The newborn child may be infected by septic organisms in several ways. The most common site is undoubtedly the umbilicus, but the point of entrance may be wounds of the ear, nose, mouth, and skin caused during delivery. The conjunctival mucous membrane may be infected from the vagina of the mother, or premature respiration before the birth of the head may result in infected liquor amnii or vaginal discharge being inhaled into the lungs or swallowed into the stomach.

SEPSIS OF THE UMBILICUS.

Infection of the umbilicus and the stump of the cord may assume various forms.

In the mildest form, when the cord separates, a little ulcer is discovered secreting pus. If this is not quickly cured, a small granuloma will appear; later inflammation may extend to the surrounding tissues and a small abscess or even gangrene result, or erysipelas may supervene. The infection may spread along the umbilical vein and cause septic hepatitis, and therefrom infection may be carried all over the body. The general signs and symptoms associated with this condition depend, of course, upon the severity of the disease. It is often associated with hæmorrhage from the umbilicus, and may be the starting point of other septic diseases about to be mentioned, although such proof is not always obtainable.

ERYSIPELAS NEONATORUM.

This disease is nearly always fatal. It is associated with a septic condition of the mother, and the seat of infection is most commonly the umbilicus.

The first signs of the disease appear near the symphysis pubis, the infection then spreads to the scrotum or vulva, thighs, buttocks, and adjacent parts. There is marked swelling with œdema, the skin is red, and the surrounded tissues indurated. Blebs appear filled with yellow serum. There is fever, the pulse is rapid and the child refuses to take nourishment. At times subcutaneous abscesses form, when the prognosis is much better. Gangrenous lymphangitis of the scrotum may occur.

HÆMOGLOBINURIA NEONATORUM (WINCKEL'S DISEASE).

This is a rare disease, usually epidemic in character. Two or three days after birth the child who appears quite healthy becomes ill, and dies within the next two days. The skin assumes a peculiar bronzed colour, the motions are greenish-black, the urine contains blood. The pulse is rapid, but there is no fever. Convulsions and squinting are present and the baby is either crying or comatose. The blood is almost black. The cause is unknown; the umbilicus appears quite healthy.

ACUTE FATTY DEGENERATION OF THE NEWBORN (BUHL'S DISEASE).

In Buhl's disease there is an acute fatty degeneration of the internal organs of the child, accompanied by cyanosis, hæmorrhages into the pleura, stomach, bowel, and umbilical bleeding. The skin is jaundiced and the children are often born asphyxiated.

MELÆNA NEONATORUM.

The appearance of blood in the fæces of the child may be of comparatively little consequence or it may be of the gravest import.

Glendining and Colwell have shown that a minute quantity of blood is a normal constituent of the fæces during the first four days following labour. They consider the presence of the blood is due to the sudden circulatory disturbance resulting upon the change to extra-uterine life leading to minute hæmorrhages into the intestinal canal. When the equilibrium is established the hæmorrhage ceases.

TREATMENT.

The child must be very carefully protected from cold, and the following drugs may be tried: 1 min. of adrenalin chloride (1 in 1,000) every two hours by the mouth, a 2 per cent. solution of glycerine properly sterilised, 2 drachms injected subcutaneously, and ergot. We have successfully treated cases by serum in doses of 10 c.c.

UTERINE HÆMORRHAGE.

Cases are recorded in which bleeding occurs from the uterus in the newborn child without apparent cause. The bleeding is not severe and usually ceases after a few days. These cases must not be confounded with precocious menstruation, a phenomenon sometimes met with and always apparently due to a hypertrophy or a tumour of the adrenal glands.

FŒTAL PNEUMONIA.

The fœtus may acquire pneumonia before its birth, generally in association with some septic condition of the mother.

Pneumonia may also be acquired by the child inhaling the liquor amnii, and for a like reason the child may suffer from capillary bronchitis. In syphilitic children born dead a massive pneumonic consolidation of the lung is often found.

FŒTAL ENDOCARDITIS.

Endocarditis may occur *in utero*, secondary to some infected condition of the mother. Congenital narrowing of the cardiac orifices may result, particularly on the right side of the heart.

OPHTHALMIA NEONATORUM.

CAUSE.

Purulent conjunctivitis in the newborn may be either gonorrhœal or non-gonorrhœal in origin.

Gonorrhœal.

Infection by the gonococcus is by far the commonest cause of purulent conjunctivitis in children, and in all cases the mother has a vaginal discharge of gonorrhœal origin before labour.

The eyes may rarely be infected whilst the child is still *in utero* through the medium of the liquor amnii, so that cases have been reported in which the conjunctivitis was already present at birth.

More frequently infection takes places whilst the head is passing through the vagina, in which case the inflammation commonly declares itself on the second or third day after birth. In other cases the organism may be conveyed by the child rubbing its eyes before it has been washed. Rarely the child's eyes may be contaminated by the nurse or mother after its birth, in which case the conjunctivitis may supervene as late as the sixth day.

Nearly always both eyes are infected, rarely one eye only is, although in the latter case the sound eye often becomes affected a day later.

SYMPTOMS.

The first indication of the disease is adhesion of the edges of the eyelids and a little discharge. The child has lacrymation and photophobia, and the eyes are kept tightly closed by tonic contraction of the obicularis. The remaining signs will depend upon whether the infection is a mild or severe one.

Mild Infection.—The discharge is almost white in colour, there is not very much of it, and the eyelids are a little red and swollen. With proper treatment the inflammation soon subsides.

Severe Infection.—The discharge is a deep yellow and very profuse in quantity, and as the edges of the eyelids are adherent, it accumulates between the eyeballs and eyelids, and when the latter are separated the pus flows away in large quantities. The eyelids are very red and œdematous. The palpebral conjunctiva is more particularly affected, and is very red, swollen and bleeds easily on being touched. If the disease is not quickly arrested the inflammation spreads to the cornea, which loses its polish. Ulceration of the cornea follows, which may be either superficial or deep, and if deep, the cornea may be perforated, leading to inflammation and total destruction of the globe of the eye.

PROGNOSIS.

The disease may be entirely recovered from, so that the eye is normal in appearance, or the sight may be lost. If there has been superficial ulceration of the cornea, the resulting formation of fibrous tissue may give rise to minute opaque spots (nebulæ), or if the ulceration has been deep, a large fibrous scar may result (leucoma), seriously interfering with the sight of the eye or not, according to its exact position. In these cases also the iris may become adherent.

Cases have been reported in which the further complication of inflammation of the joints (gonorrhœal arthritis) has arisen, the diagnosis having been confirmed by detection of the gonococcus in the fluid which has been aspirated from the joint. This complication has appeared during the third week. The joints recover, as a rule, but suppuration may occur.

Non-gonorrhœal.

In these cases the child's eyes are affected by some other organism than the gonococcus, either present in a vaginal discharge or introduced from some external source.

The instillation of strong antiseptics into the eye may also produce conjunctivitis.

The inflammation appears towards the end of the first week, is not as a rule so severe as the gonorrhœal variety, but otherwise presents similar symptoms and signs.

TREATMENT.

Prophylactic.—**Mother.**—If the mother has a vaginal discharge it should be carefully treated before labour with vaginal douches twice daily of 1 in 4,000 biniodide of mercury. The douche should also be given when the mother is in labour, both before and after the membranes have ruptured.

The treatment of gonorrhœa complicating pregnancy is described on p. 145.

Child.—Immediately after the birth of the head the eyelids should be carefully swabbed with boric acid solution, or biniodide of mercury, 1 in 5,000, so as to remove all traces of mucus, blood, or pus, a separate swab being used for each eye.

In addition, when the child has been washed, if the mother has a vaginal discharge or has had gonorrhœa recently, two drops of 1 in 2,000 biniodide of mercury or of a 2 per cent. solution of silver nitrate should be placed in each eye.

The nurse must be careful not to wash the child's eyes in the

same water that its body has been washed in, and the child should be prevented from rubbing its eyes until after the bath.

If ophthalmia supervenes, the child when in its cot should have its hands tied to its side, and it should lie on the side of the affected eye if only one is inflamed. The unaffected eye should be covered by a "Buller's" shield.

Doctor and Nurse.—As the discharge is so virulent, the doctor and nurse must take great care that they do not infect their own eyes. They should, therefore, scrupulously cleanse their hands after the child's eyes have been attended to, and if, perchance, any of the discharge spurts up into the eye of the doctor or nurse, the conjunctival sac should be at once irrigated with 1 in 4,000 biniodide of mercury.

Curative.—The success of the treatment when the disease has once declared itself will almost entirely depend upon the nurse. It is most necessary, therefore, that a capable nurse should be available. The routine treatment consists in

1. Swabbing away any pus that collects round the eyelids and on the cheeks as soon as it appears with swabs soaked in biniodide of mercury, 1 in 4,000.

2. Every two hours, or at times more often than this, the conjunctival sac should be irrigated with 1 in 5,000 biniodide of mercury or chloride or sulphate of zinc, 1 or 2 gr. to the ounce of water. If one lotion does not effect improvement, another should be tried.

3. Silver nitrate solution should be applied to the eyelids either in a mild case by instilling a few drops of a solution, 2 gr. to the ounce of water, two or three times a day; or in a severe case by brushing the lids once daily with a solution of 10 or 15 gr. to the ounce.

4. Occasionally during the day the edges of the eyelids should be anointed with a little iodoform ointment, 15 gr. to the ounce of vaseline.

Methods of Applying these Remedies.—Irrigation with Lotion.—The nurse places the baby on her lap with its head resting on a towel, and turned towards the eye about to be treated. With the index finger and thumb of the left hand she separates the eyelids, and then douches the eyes with the lotion by means of an india-rubber syringe sold for the purpose, the lotion being introduced at the nasal side of the eye.

Painting with Nitrate of Silver.—The child is best held as follows: The doctor and nurse sit facing one another in a good light. The nurse holds the body of the child on her lap, keeping it

steady by holding its arms, whilst the shoulders are rested on the doctor's leg, and the head firmly held by gripping it gently between the two knees.

The eyelid is now everted, carefully swabbed with a little boric lotion, and the silver nitrate applied on a camel's hair brush, after which the eye is well douched with boric lotion.

If there is great difficulty in everting the eyelids, the camel's hair brush may be passed along the inner surfaces, care being taken to keep it off the cornea, and in this case only a little solution must be used, because the cornea is easily damaged by it, and ulceration may be set up. If ulceration of the cornea does supervene, a little atropin ointment, 2 gr. to the ounce of vaseline, should be applied between the eyelids.

HÆMORRHAGE FROM THE UMBILICUS.

Hæmorrhage from the umbilicus may be primary or secondary.

Primary Hæmorrhage.

CAUSE.

The bleeding may be due to the fact that the ligature has slipped, or, on the other hand, has been too tightly applied, so that the vessels have been cut through.

TREATMENT.

The treatment is obvious; the cord must be religatured.

Secondary Hæmorrhage.

CAUSE.

In this case the hæmorrhage is merely a symptom of septic infection of the umbilicus. It has been noted in connection with congenital syphilis, Buhl's disease, and the severe variety of jaundice. In some cases the cause is hæmophilia.

SIGNS AND SYMPTOMS.

The bleeding commences after the cord separates from the fifth to the seventh day. The disease is a very fatal one, 80 per cent. of the children dying in a short time. Males are more frequently attacked than females. The child has the symptoms of umbilical sepsis, namely, vomiting, jaundice, a purpuric rash and coma.

The bleeding is of the nature of an oozing from the separated surface.

TREATMENT.

It is often found impossible to stop the bleeding in these cases.

The treatment is to underpin the umbilicus with harelip pins or to insert mattress sutures.

JAUNDICE.

The causes of jaundice may be divided into two classes: due to changes in the blood and disease of the liver respectively.

Hæmatogenous Jaundice.

In 80 per cent. of children about the third day after birth the skin becomes yellow. The intensity of the staining varies; in some cases the skin is very yellow. The urine is free from bile and the fæces retain their normal colour, and the sclerotics are often not stained. This variety of jaundice, which is more likely to arise in premature children, is said to be due to the breaking down of a large number of red blood corpuscles.

The discoloration passes off in a few days. When marked, the child is usually drowsy.

Disease of the Liver.

In congenital obliteration of the bile ducts the jaundice appears in a few days. The urine contains bile, the fæces are clay coloured. Hæmorrhage from the umbilicus is common, and the child may have hæmatemesis and malæma.

Few of the children survive, and there is no treatment which has any effect. Syphilis is also responsible for jaundice in some cases by causing hepatitis. As already mentioned in cases of umbilical sepsis, Buhl's disease or Winckel's disease, jaundice of a severe nature may arise.

TREATMENT.

The hæmatogenous jaundice requires no treatment. Jaundice due to stenosis of the bile duct is incurable, but in syphilitic hepatitis specific remedies may be tried. The treatment of septic jaundice depends on the cause.

THRUSH.

CAUSE.

A disease of the mucous membrane of the alimentary canal due to a fungus, oïdium albicans, the child becoming infected in nearly all cases through the medium of dirty bottles, teats, the nipples of the mother, or insufficient cleansing of the child's mouth.

The disease may be carried from one child to another.

SYMPTOMS.

As a rule the child is fretful and crying from colic. It may vomit and have diarrhœa.

The disease most often attacks the child's mouth. In this case small, round, slightly raised white spots will be noted on the mucous membrane of the mouth and throat. The spots are more or less firmly attached, and when removed the area of attachment is redder than normal, thus differing from small curds, with which they are apt to be confounded, which are easily removed and their area of attachment not reddened.

If the disease spreads to the intestine the results may be very serious and the end fatal.

TREATMENT.

Prophylactic.—Great care must be taken to keep the mother's nipples and the child's mouth scrupulously clean by carefully wiping them with a saturated solution of boric acid before and after nursing.

If the child is bottle-fed the bottle must be kept very clean, and the teats should be boiled for a minute or two before and after use.

Curative.—As thrush is most often due to some neglect of the above precautions, careful inquiries must be made and any deficiencies rectified. In addition, the mouth should be swabbed with boric lotion several times a day, and a few drops of boracic acid glycerin administered.

TONGUE-TIE.

Real tongue-tie, that is, a frenum attached so near the tip of the tongue that the child is unable to "put the tongue out," is rare. Occasionally it does occur, in which case the child may experience much difficulty in sucking.

TREATMENT.

If the tongue is really tied, it can be freed by snipping it with a pair of blunt-pointed scissors as near its lingual attachment as possible. The operator should remember that with carelessness the lingual artery on one or other side may be cut.

TETANUS NEONATORUM.

The site of infection of the tetanus bacillus is in nearly all cases the umbilicus; rarely it has been the raw surface resulting from circumcision. The disease is a very fatal one, nearly all the children dying.

SIGNS.

The muscles of the jaw, trunk, and limbs are mostly those affected, and in this order. The disease makes its appearance towards the end of the first week.

TREATMENT.

Prophylactic.—Tetanus neonatorum was not so many years ago known, according to Ballantyne, as the "Scourge of St. Kilda," an island in the Western Hebrides where the population nearly became exterminated, eight out of every ten babies dying the eighth day after birth. The disease was also locally known as the "eight-day sickness." Its cause baffled many observers for a long while, but when at last the umbilical cords were treated with antiseptic precautions, the disease disappeared as if by magic.

Curative.—It may be necessary to use chloroform to overcome the muscular spasms, and anti-toxin may be tried.

ANTE-NATAL RIGOR MORTIS.

Ante-natal rigor mortis may give rise to difficulty in labour owing to the rigidity of the child. That it is not often seen is due to the fact that this rigidity takes some little time to supervene and only lasts a short time, and the child must be delivered during this short period for the rigor-mortis to be noted.

MASTITIS NEONATORUM.

The breasts of newborn children, male or female, may become distended and for a short time secrete a fluid which has the chemical properties of milk. The secretion soon dries up and no treatment is necessary. Unfortunately ignorant nurses will sometimes try to improve matters by squeezing and massaging the breasts, "breaking the breasts strings" as it is termed, in which case mastitis has been known to result, and even mammary abscess.

CONGENITAL ATRESIA OF THE LARYNX.

Congenital atresia of the larynx leads to asphyxia neonatorum, and has to be diagnosed from the similar condition due to a cerebral lesion, laryngismus stridulus, a patent foramen ovale, tongue swallowing and atetectasis pulmonum.

SORE BUTTOCKS.

Sore buttocks may be due to one of the following causes: Neglect in changing the diapers when soiled, want of cleanliness, failure to

dry the buttocks properly, the use of diapers which have been washed in water containing soda, irritant diarrhœa, syphilis, and the use of irritating soaps.

SYMPTOMS.

The child is fretful and cries from the pain due to the urine or fæces irritating the affected skin. The skin covering the buttocks becomes scarlet in colour, is rough, cracked, often raw, sometimes ulcerated and rarely bleeds.

TREATMENT.

Prophylactic.—The buttocks should be smeared with vaseline for the first three days whilst the meconium is being evacuated. The towels used for drying the buttocks should have been washed in water free of soda, so that it is better to use for this purpose pieces of lint unless the towels are washed at home.

The diapers should also be washed in soda-free water. The greatest care should be taken to keep the buttocks as dry as possible, and if the motions are unhealthy, appropriate remedies should be prescribed.

Curative.—If the buttocks become sore, olive oil should be used in the place of water to cleanse them, after which they must be dried with a piece of soft lint.

The affected surface should then be plastered with an ointment made of equal parts of zinc oxide and castor oil. If the condition is very severe, it is best to spread the ointment on lint.

If the condition, as is rarely the case, is due to syyhilis, the proper treatment for this disease must be prescribed, see p. 755.

COLIC.

CAUSE.

If a child is suffering from colic, this is, as a rule, an indication that its feeding is in some way or other at fault, and if the fæces are examined, undigested curds will be usually discovered.

SYMPTOMS AND SIGNS.

The child is very fretful, cries constantly, and because of the pain draws its legs up to its abdomen.

TREATMENT.

The method of the feeding and the quality of the food must be carefully investigated.

RETENTION OF URINE.

CAUSE.

Retention of urine may be due to an imperforated urethra, phimosis, or a piece of vernix caseosa plugging the urethral orifice.

SIGNS.

An elastic tumour above the pubes will gradually form and the child will be fretful.

TREATMENT.

Care must be taken to ensure that retention of urine is really present. It is not unusual to receive a report from the nurse of this nature when the urine has been passed in the bath and has thus escaped notice.

If the retention is due to phimosis the child must be circumcised; if to an imperforate urethra, the question of a surgical operation has to be considered. A plug of vernix caseosa can be removed. If the retention is due to none of these, hot fomentations may be applied to the abdomen, the child may be put into a hot bath, or the urine may have to be drawn off by catheter.

CONSTIPATION.

CAUSE.

This condition is due to the food of the child being deficient in fat, and is therefore much commoner in bottle-fed children.

TREATMENT.

If the constipation is due to a deficiency of fat, this can be remedied by the addition of cream to the milk if the child is being artificially fed. If the mother is nursing the child, her milk should be analysed, and if the fat is insufficient, she must wean her child; before doing so, however, the child may be treated with castor oil, olive oil, glycerine, liquid paraffin, and citrate of magnesia.

DIARRHŒA.

CAUSE.

Diarrhœa is due to some bacterial changes in the milk, or to the irritation produced by milk curd not properly digested. The first is particularly common in the summer, when the micro-organisms with which the milk becomes contaminated are able to grow much more luxuriantly. The motions become green, and vomiting is often present in addition. The child rapidly wastes, the buttocks are excoriated, and if untreated a condition of marasmus will super-

vene. In diarrhœa due simply to undigested curd the motions are watery, with pieces of curd in them. The general symptoms are less severe. The child has colic, and loses weight. Both classes are much commoner in bottle-fed children.

TREATMENT.

As diarrhœa is the commonest cause of mortality in young children, the quality of the food and the source of its supply should be carefully inquired into. Great care must also be taken to see that the bottles and teats are clean. Diarrhœa due to bacterial infection should be treated by the preliminary administration of castor oil to clear out the intestine. This effected, intestinal antiseptics should be given, such as Liq. Hydrarg. Perchlor., ♏ x; Calomel, gr. $\frac{1}{8}$; Pulv. Hyd. c Crete, gr. $\frac{1}{6}$; Salol, gr. 1; or Bismuth Salicylate, gr. 1. If these fail, irrigation of the colon should be resorted to, the bowel being washed out with boracic acid solution.

CONVULSIONS.

CAUSE.

Convulsions appearing soon after the birth of the child are generally due to intra-cranial hæmorrhage. They may also occur in cases of eclampsia. Later, the convulsions are most often due to some error in diet.

TREATMENT.

The cause of the fit must, if possible, be ascertained and the child treated accordingly. For the fit itself the child may be placed in a bath of water, the temperature of which should be 105° F. Small doses of bromide of potassium can be used to keep the fits in abeyance.

ARTHRITIS AND OSTEO-MYELITIS.

CAUSE.

Inflammation of the joints of the newborn child and of its bones is due to sepsis. It may be suppurative in character, and very often ends in death. It is not always possible to identify the seat of infection, though doubtless it is generally the umbilicus. In one case under our care the most careful investigation in this respect proved unsuccessful.

SIGNS.

The signs are those ordinarily associated with arthritis and osteo-myelitis.

TREATMENT.

The joint must be kept fixed on a splint, and on the least indication of pus it should be opened.

HÆMATOMA OF THE UMBILICAL VEIN.

This rare condition may be due to a varicosity of the vein, intra-uterine torsion of the vein or traumatism. The blood effuses along the cord and under the skin in the region of the umbilicus. The tumour may attain a considerable size.

TREATMENT.

The condition is best left alone, except for protecting the tumour with a little cotton-wool.

THE CHILD AND TRANSMITTED DISEASE.

A pregnant woman can transmit certain diseases she is suffering from to her unborn child, and the latter may be born with evidence of the disease. Thus the following diseases may be transmitted to the child: Small-pox, chicken-pox, measles, scarlet fever, typhoid, erysipelas, malaria, tuberculosis, epidemic cerebro-spinal meningitis, pneumonia, anthrax, rheumatic fever, relapsing fever, yellow fever, cholera, influenza, exoptbalmic goitre, and syphilis. It is interesting to note that a child born whilst the mother is suffering from small-pox may show no signs of the disease and yet be immune to vaccination.

At the same time it must be pointed out that such transmission is rare and only very occasionally occurs, except in the case of syphilis.

SYPHILIS.

The subject of syphilis in connection with childbearing has already been dealt with, see p. 147. As has there been stated, syphilitic children are usually born healthy in appearance, but develop signs of the disease from three to six weeks after birth. Of these, syphilitic rhinitis is one of the commonest, the child being afflicted with an ichorous discharge from the nose. Various types of eruption are also present, the most characteristic being scaly reddish-brown patches, that have been likened in colour to raw ham, but papules, vesicles or pustules are all common, either singly or combined with one another. The skin has a shrunken, dry, and earthy appearance, and mucous tubercles, ulcers and

fissures beset the mouth, anus, and genital regions. Untreated, these children pass into a marasmic condition and perish.

TREATMENT.

Infants are remarkably tolerant of mercury. The drug is best administered in the form of grey powder, gr. $\frac{1}{6}$, three times a day to begin with, and increased in quantity at the discretion of the practitioner. Where infective diarrhœa is present, calomel in similar doses may be used instead, or Liq. Hydrarg. Perchlor., ♏ x. Treatment by inunction is favoured by some authorities, a small quantity of blue ointment being rubbed into the skin of the abdomen daily.

The results obtained by these methods are so satisfactory that it is rarely necessary to resort to any others. In obstinate cases, however, the question of the injection of mercury or salvarsan will have to be considered.

A woman known to be syphilitic may nurse her syphilitic child, but if the child be born healthy in appearance, the mother being known to be syphilitic, it would be best to bring the child up on the bottle and immediately begin anti-syphilitic treatment before the lesions declared themselves. Where doubt as to the mother being syphilitic exists, the father being undoubtedly so, it will be best to await manifestations in the child before beginning treatment.

A child that has developed syphilitic signs should not suckle its mother if she herself has never had signs of the disease and her blood is negative to Wasserman's test. Such a condition is very unlikely, for all modern evidence goes to show that the mother of a syphilitic child is herself syphilitic. Where the mother has only incurred the disease a few weeks before the birth of the child, suckling should certainly be prohibited, for in this case, if the disease is in the primary stage in the mother, placental transmission may not have occurred.

TUBERCULOSIS.

Children have been born, as proved by *post-mortem* examination, with marked tubercular lesions in their liver, lungs, spleen and bronchial glands. Fortunately such transmission is exceedingly rare, and there are not many such cases on record. The children of tuberculous parents undoubtedly inherit a certain diminished resistance to the invasion of the tubercle bacillus, but when placed under suitable surroundings, they may grow up into healthy men and women and live to a good age.

FŒTAL GOITRE.

In some of the reported cases there has been a history of goitre in the family, and one of our patients with marked exopthalmic goitre gave birth to a child with one of these tumours. The second child of this patient was, however, quite healthy, and this has been noted before, as has also the fact that there may be no family history of this nature to be obtained.

A child may be born with a goitre varying in size up to that of the head of a newborn child, and one lobe may be enlarged or both.

If the tumour is of any size, it may prevent flexion of the head and the face may present, or for the same reason the advance may be delayed by presentation of a brow. After the birth of the child the prognosis will depend a good deal upon the size of the tumour. It may be so large that the trachea is compressed and the child is suffocated. Short of this, the child may be cyanosed, suffer from dyspnœa, and a difficulty in swallowing will prevent its taking sufficient nourishment. It has been noted that if the child lives, the tumour has a tendency to gradually decrease in size.

TREATMENT.

Tracheotomy may be necessary as an immediate remedy, or part of the tumour may be removed. Thyroidectomy is fatal.

ENLARGEMENT OF THYMUS GLAND.

Congenital enlargement of the thymus gland induces tracheal spasm and dyspnœa. A case is on record in which death is due to this cause.

CONGENITAL HYPERTROPHIC STENOSIS OF THE PYLORUS.

The condition occurs more often in males.

SIGNS.

The predominant sign is vomiting, which commences as a rule within three weeks of birth, and is not improved by modification of the food. The vomiting does not occur every time the child is fed, but when it does it is noticed that the quantity of fluid ejected is far in excess of what the child could have just taken, whilst the fluid is squirted through the mouth and nose with considerable force. The bowels are constipated and the quantity of fæces passed is small.

On examination of the child's abdomen, a tumour, the hypertrophied pylorus, may sometimes be felt, and marked peristalsis of the stomach may be observed or excited by palpation.

The child loses weight rapidly, and the food retained in the stomach before it is expelled may undergo fermentative changes.

TREATMENT.

The treatment may be medical or surgical.

Medical Treatment.—The food must be given in small amounts and frequently, so that at first 1 oz. or even much less should be given every hour. The amount will be gradually increased according to the progress of the child. A small quantity will be better able to escape through the pyloric opening. The milk should be made as digestible as possible by peptonisation, so that there may be a minimum of undigested material to pass the pylorus.

The stomach should be emptied and washed out, after which the food should be introduced through the tube. This will do away with the child sucking, which in itself is apt to start peristalsis of the stomach and vomiting. If the vomiting is at all marked, the child must be given rectal saline injections to make up for the fluid which has been lost.

Surgical Treatment.—The operation most commonly performed is gastro-enterostomy.

PROGNOSIS.

Lapage points out that if the cases are chosen and medical treatment is commenced early, the prognosis is quite good, the majority of children recovering. Where, however, the onset of the symptoms is very early and is of such a nature that almost complete obstruction appears likely, surgical measures should be undertaken at once before the child's health has deteriorated. The surgical mortality is stated to be from 50 to 70 per cent., but it must be remembered that the surgeon has to deal with the worst cases.

PHIMOSIS.

This condition may be a cause of retention of urine, or the straining necessary to expel the urine through such a small orifice may soon result in the formation of a hernia.

TREATMENT.

Circumcision.

IMPERFORATE URETHRA.

With this condition the bladder may be very dilated and hypertrophied, and the kidneys may be hydro-nephrotic. The children do not live.

IMPERFORATE RECTUM.

The cause of this may be simply a membrane obstructing the rectum, which can easily be broken down, or one inch or more of the rectum may be solid, in which case a plastic operation would have to be undertaken.

It sometimes happens that the anus itself may be patent, and the obstruction which is higher up is therefore likely at first to remain unnoticed.

The importance, therefore, of an immediate examination to test the patency of this canal is evident in cases of Cæsarean section, if the mother is to be sterilised, since if the child has an imperforate rectum and the parents are anxious for a child which has any chance of surviving, the mother must not be sterilised.

Operations for the cure of this deformity are unsatisfactory.

TALIPES.

The treatment of this malformation should be begun early, when very good results may be expected. The details of the methods employed need not be considered here.

HARELIP AND CLEFT PALATE.

The child, being unable to suck with these malformations, it will have to be fed artificially. The operation for the correction of the deformity should be performed within the first few weeks after birth.

DIAPHRAGMATIC HERNIA.

This rare condition has been found on *post-mortem* examination of a child dying soon after birth. No treatment is possible.

UMBILICAL HERNIA.

There are two varieties of umbilical hernia, congenital and acquired.

In the first case the deformity consists of a protrusion of the intestine into the umbilical cord, and is due to the persistence of the omphalo-mesenteric duct. Michel's diverticulum, the lower part of the ileum, the cæcum and apex of the bladder are usually found in the sac, which may be very large.

Fig. 297.—Congenital Hernia of the Umbilicus. Sac springing directly from Base of Cord.

As a rule the sac projects directly from the umbilicus (Fig. 297). Rarely it may be situated some little distance up the cord with a short length of the latter intervening between it and the umbilicus through which runs a narrow channel of communication between the peritoneal cavity and the sac of the hernia. In a case that

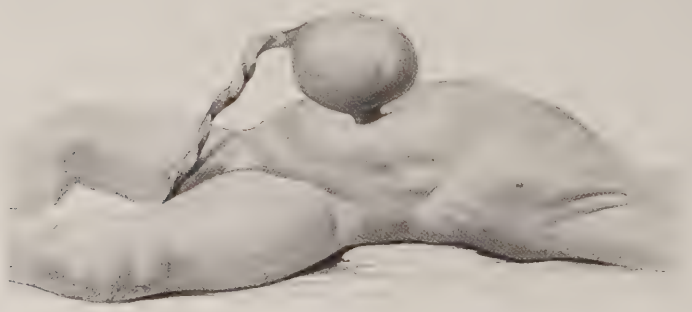


Fig. 298.—Congenital Hernia of the Umbilicus. Sac situated some distance up the Cord.

came under the care of one of us the practitioner had divided this short length of cord that intervened between the sac and the umbilicus, thus removing the intestinal tract from just below the duodenum to the rectum (Fig. 298).

The second variety is due to protrusion of the umbilical scar from straining.

TREATMENT.

In congenital cases care should be taken to ligate the cord well above the hernial sac, lest the bowel should be injured and a fistula result. The sac should be treated by immediate operation. In the case we have just mentioned an end-to-end anastomosis of the bowel failed to save the life of the child. Protrusion of the navel from straining should be dealt with by placing a pad over the umbilicus and retaining it there by an abdominal binder. The cause of the straining must be sought for and cured.

TUMOURS OF THE SACRUM.

Children born with spina bifida or teratomatous sacro-coccygeal tumours do not usually survive. Where, however, the infant appears otherwise healthy, the question of surgical treatmust must be considered, see p. 422.

INJURY TO THE SCALP.

CAUSE.

The skin of the skull and face may be injured by the pressure of the sacral promontory or the forceps during delivery.

SIGNS.

The appearance varies with the amount of pressure. In slight cases there is merely a red spot or line, which soon disappears. If the pressure has been more than this, there will be distinct bruising owing to the rupture of small vessels.

TREATMENT.

The red and bruised patches disappear without treatment, the white patches slough, and should be treated as any other wound of a similar nature.

OVERRIDING OF THE SUTURES.

During delivery the head is moulded; this moulding is largely brought about by the cranial bones overriding one another. When the moulding is very marked, as in cases of contracted pelvis, this overriding increases to a dangerous degree, so that occasionally the veins and sinuses in the region of the sutures are torn and fatal intra-cranial hæmorrhage results.

EXTRA-CRANIAL HÆMORRHAGE.

Cephal-hæmatoma. Supra-osteal Hæmatoma.

Whilst in a few cases no cause can be discovered, in the majority the hæmatoma is due to the rupture of one of the small emissary veins during delivery in a difficult labour. The effused

Fig. 299.—Cephal-hæmatoma.

blood collects between the pericranium and the bone, and is commonly known as a cephal-hæmatoma (Fig. 299).

The swelling may appear on any part of the head, but since the pericranium is joined to the dura mater along the suture lines, the cephal-hæmatoma is always limited to one bone, and that as a rule a parietal. A cephal-hæmatoma has been mistaken for a

caput succedaneum, and the following are the chief points of difference:

Cephal-hæmatoma.	*Caput Succedaneum.*
Slow effusion of blood.	Rapid effusion of serum.
May be present at birth, if not, will appear during the first three days.	Always present at birth.
May increase in size after birth for the first week.	Decreases in size after birth.
No discoloration over the swelling.	Skin over swelling darker than that over the rest of head.
Disappears in 1 to 3 months.	Disappears in 1 to 3 days.
Swelling never crosses a suture.	Swelling may be over a suture.
Swelling may fluctuate.	Swelling does not fluctuate.

Towards the end of the first week, owing to inflammation round the periphery of the swelling, a hard ring is felt, and this, together with the softest centre, suggests a depressed fracture of the skull.

A cephal-hæmatoma might also be mistaken for a meningocele or meningo-encephalocele. In the case of the latter the tumour pulsates synchronously with the heart and with the respiratory movements. When the child cries the two latter can be felt to become more tense and pressure upon them may produce convulsions.

TREATMENT.

Treatment is unnecessary unless the hæmatoma suppurates, a rare occurrence, when the abscess must be incised and treated on general principles.

INTRA-CRANIAL HÆMORRHAGE.

The hæmorrhage, which is generally bilateral and on the surface of the brain, is due to abnormal pressure on the head during delivery. A contracted pelvis and artificial delivery with forceps are the usual determining causes. In most cases of death during delivery an intra-cranial hæmorrhage will be found.

The blood may escape from ruptured vessels between the dura mater and the bone (subosteal hæmatoma), or from the rupture of vessels in the pia mater (cortical or subpial hæmatoma).

SYMPTOMS AND SIGNS.

Children, the subjects of intra-cranial hæmorrhage, may be born dead or die afterwards without any symptoms pointing to such. In other cases there is constant screaming or incessant vomiting.

The child will not take its food, becomes cyanosed, and the breathing may be irregular. In addition, the limbs may be persistently rigid, and there is inversion of the thumbs, bulging of the anterior fontanelle, which does not pulsate, opisthotonos and convulsions.

Lumbar puncture reveals blood in the cerebro-spinal fluid.

PROGNOSIS.

The children with intra-cranial hæmorrhage generally die by the

Fig. 300.—Facial Paralysis.

fourth day. If they recover, they may be paralysed, idiots, or epileptics. If the hæmorrhage has been a basal one, the child as a rule dies during or just after birth.

TREATMENT.

This variety of hæmorrhage would be best treated by an early osteo-plastic resection, especially if fits were present. Unfortunately

the condition is difficult to diagnose and the state of the child is usually hopeless before the gravity of the symptoms is recognised.

Lumbar puncture or puncture of the anterior fontanelle which is usually bulging has been successful.

FIG. 301.—Gutter Fracture. Correction by Pressure.

INJURY TO THE CRANIAL NERVES.

CAUSE.

The trunk of the facial nerve may be injured as it escapes from the skull by one blade of the forceps, or its nucleus may be damaged during the birth of the child.

SIGNS AND RESULTS.

The amount of paralysis and the prognosis depends upon whether the injury is peripheral or central. In the commonest variety (peripheral injury) the paralysis is more or less complete, but the prognosis is good, the paralysis soon disappearing. In the central variety the paralysis is not so complete, but is often of a permanent nature (Fig. 300).

DEPRESSION OF THE CRANIAL BONES.

CAUSE.

1. The depression is generally due to the pressure of the sacral promontory against the posterior parietal bone during the passage of the head in a flattened pelvis.

2. It may also be due to the forceps not being applied properly, so that the head is grasped by the tips of the blades only.

SIGNS.

The depression, which is easily identified, is either in the form of a groove or resembles the bowl of a spoon. There may be a cephal-hæmatoma in addition.

TREATMENT.

Very often the depression disappears. If it does not, an attempt may be made to elevate it by gentle pressure of the skull in the long axis of the depression, failing which it should be rectified by an operation, since paralysis, epilepsy and idiocy have followed in many cases (Fig. 301).

FRACTURE OF THE SKULL.

CAUSE.

Fracture of the cranial bones is due to pressure of forceps or of the sacral promontory in cases of difficult labour. It is at times associated with a depression, and most often with both extra- and intra-cranial hæmorrhage.

TREATMENT.

If the child is not dead there might be a chance of its survival if the bone were elevated.

FRACTURE OF THE FACIAL BONES.

The nasal, orbital and jaw bones may be fractured with the forceps during delivery, and the lower jaw may be fractured during the jaw-and-shoulder traction of breech delivery.

INJURY TO THE EYES OF THE CHILD.

CAUSE AND VARIETY.

The pressure to which the eyes are subjected during a long second stage may lead to œdema, with diffuse temporary opacity of the lens, or the posterior lamina of the lens may be ruptured, when a permanent linear opacity may result, which may be masked for a few days or weeks by the diffuse opacity.

Forceps delivery may cause traumatic keratitis or intra-ocular hæmorrhage.

Depressed fracture of the frontal bone may lead to conjunctival ecchymosis, small retinal hæmorrhages, or even evulsion of the eyeball.

Infection of the liquor amnii or a vaginal discharge may give rise to purulent conjunctivitis before or during labour, which disease may also be acquired after birth by infection from a discharge or careless attention to the eyes, see p. 745.

INJURY TO THE EARS.

The ear may be torn partly or completely off during forceps delivery should the instrument slip.

TREATMENT.

The portion detached, or the whole ear if necessary, should be sutured into its proper position.

DISLOCATION OF THE CERVICAL VERTEBRÆ.

CAUSE.

Excessive traction on the head during forceps delivery, or on the body during breech delivery, may dislocate the cervical vertebræ.

HÆMATOMA OF THE STERNO-MASTOID MUSCLE.

CAUSE.

Hæmorrhage into the sterno-mastoid muscle may be due to traction on a breech or delivery by forceps, most commonly the former.

SIGNS.

A lump appears in the region of one or other sterno-mastoid muscles (Fig. 302).

RESULT.

As a rule, the tumour has disappeared in a few weeks or months. Sometimes as a result of inflammation, contraction in the muscle takes place, and the child has a wry-neck.

INJURIES TO BONES AND JOINTS.

FRACTURE.

The bones of the leg may be fractured during version, or when delivering an impacted breech by bringing down a leg or making traction on the groins. If the arms are extended or displaced

dorsally, the bones may be fractured when the arm is being brought down.

The lower jaw may be broken during jaw-and-shoulder traction, the clavicle may be broken during extraction of the arms or delivery of impacted shoulders.

The long bones may also fracture spontaneously as a result of

FIG. 302.—Hæmatoma of the Sterno-mastoid.

deficient ossification. The importance of this is apparent, since every fracture need not necessarily be due to the manipulations necessary for delivery.

SEPARATION OF EPIPHYSES.

During the attempts to release the arm, an epiphysis of the humerus may be separated, and the same accident may occur to the femur if the leg is pulled upon.

DISLOCATION OF JOINTS.

The shoulder, hip, jaw, and neck may be dislocated during the delivery of the child. It must be remembered that in most cases when the hips are found to be dislocated at birth, the cause is a congenital one.

The neck may be dislocated if the head is pulled upon too forcibly, or if the body is treated in a similar way. The lesion generally occurs between the fifth and sixth vertebræ.

The child does not breathe, although the heart may continue to beat for a long while.

TREATMENT.

If the humerus is fractured, it should be splinted and bandaged to the side of the body.

If the femur is fractured, the child should be placed on its back, and its legs kept at right angles to its body by means of suitable apparatus, or the whole length of the leg on the affected side may be bandaged to the front of the trunk.

A fractured clavicle is treated by bandaging the corresponding arm to the body of the child.

Fracture of the lower jaw must be treated by a jaw bandage. Separation of the epiphyses should be treated by splints, and dislocations must be reduced.

INJURY TO THE BRACHIAL PLEXUS.

CAUSE.

The brachial plexus may be injured by pressure of the forceps on the posterior triangle of the neck, by pressure of the finger or blunt hook in the axilla, by traction on the arms during a breech or transverse delivery, or by traction on the head.

There is a special variety of paralysis, however, known as Duchenne's, in which the fifth and sixth cervical nerves only are affected. This variety is thought to be due to a lateral flexion of the head, which would affect the fifth and sixth nerves only. As a result of the trauma, the perineal sheath ruptures, hæmorrhage ensues, and organisation of the clot and cicatricial contraction follows.

SIGNS.

Fifth and Sixth Nerves only.

The shoulder is flaccid, the arm is rotated inwards and adducted, the forearm is extended, and the palm of the hand looks backwards.

The Whole Plexus.

The limb is paralysed, the eyeball on the injured side is retracted and there is myosis, the last cervical and first dorsal nerve being in communication with the cervical sympathetic by means of the vagus communications.

PROGNOSIS.

Only 26 per cent. of the children recover.

TREATMENT.

Warmth, massage, and galvanism are indicated. If there is no improvement within three months, an operation had better be performed. The cicatrix, which is nearly always at the junction of the fifth and sixth nerves of the damaged arm, should be excised and the ends of the nerves sutured.

INTRA-UTERINE AMPUTATION OF LIMBS

It sometimes happens that bands may be formed between various parts of the amniotic sac and the child's body. One of these bands may press upon and constrict a limb, in which case its growth will be hindered, or it may even be amputated. This condition arises in early fœtal life, and is accompanied by a diminished amount of liquor amnii.

INTRA-UTERINE DISLOCATIONS.

Before such a diagnosis can be made, the causes of dislocation during delivery must be eliminated, after which there will be a few real cases remaining. The hip is most often affected, on one or both sides, and then the shoulder.

INTRA-UTERINE FRACTURES.

Children may be born with evidence of old fractures, as shown by the presence of callus and faulty union. Apart from fracture during delivery, it is thought that the fœtal bones may be broken owing to their unusual brittleness, to the strength of the fœtal movements, or to some traumatism of the mother. It is more probable that the fracture is due to some error in development, or is associated with syphilis or rickets.

INJURIES TO THE VISCERA.

The thoracic and abdominal viscera are occasionally injured during delivery, especially when this is operative. Thus the liver or spleen may be ruptured during the extraction of the trunk in breech delivery. The liver has been ruptured by strong fundal pressure.

CHAPTER XXXIV.

Artificial Feeding of Infants.

A PERFECT food must contain proteids for elaboration into protoplasm, which forms the essential part of all living tissues; fats to maintain the body temperature and to form certain parts of the nerve tissue; sugar, which also helps to maintain the body temperature, and produces part of the energy for the performance of muscular work; salts, which assist in the formation of hydrochloric acid as an aid to digestion, enter into the constitution of bone, and combine with certain poisons elaborated by the body, so rendering them harmless; and water in which the proteids, sugar and fats can dissolve, thus increasing the solubility and efficiency of digestion, and which in addition "washes out" the poisons resulting from food digestion. Now whereas the food of children and adults may and does contain different kinds and quantities of proteids, fats and sugars, that of infants should only contain these in fixed kinds and quantities.

Nature has supplied such a food in milk, and this only, therefore, should be the staple article of diet for infants up to nine months of age.

Human milk, so long as it is of the proper quality, is the best food for infants, and failing this the most convenient substitute that can be obtained is cow's milk.

ANALYSIS OF HUMAN MILK AND COW'S MILK.

	Human Milk.	Cow's Milk.
Proteids ...	1·5	3·5
Fat ...	4	4
Sugar ...	7	4·5
Salt ...	·25	·75
Water ...	86·75	86·50
Reaction ...	Alkaline	Acid

These figures are sufficiently correct for all practical purposes.

Proteids.—The proteids of milk consist of caseinogen and lactalbumin. Caseinogen when it reaches the stomach is converted by the rennet into curds; on the other hand, rennet has no effect on lactalbumin, which on reaching the stomach still remains in solution and is therefore much more easy of digestion.

Now a comparison of the proteids of human and cow's milk shows that the quantity of proteids in the latter is twice as much as that of the former, and further, the quality is also reversed, for whereas in the proteids of cow's milk there is a preponderance of caseinogen, which, on account of the hard curds it forms, is difficult for the infant to digest, in human milk there is most lactalbumin, which is easier of digestion.

The problem of infant feeding is largely concerned with the proteids, since they are the most difficult substances for its stomach to digest. It therefore results that if the infant is being fed on cow's milk this will have to be diluted with water in order to obtain the right quantity of proteid.

With such a dilution, however, it is at once apparent that the percentages of the fat, sugar, and salt are lowered. Sugar and fat should therefore be added.

The cow's milk thus prepared is still inferior to human milk, since it is acid, contains a larger proportion of caseinogen than lactalbumin, and is not sterile.

The acidity of cow's milk can be corrected by the addition of lime-water, the relative proportions of the two proteids can be adjusted by the addition of whey or albulactin, and any bacteria that may have infected the milk can be destroyed by heat.

Cow's milk is even then, however, inferior to human milk, in that heating it to a degree which would for certain destroy bacteria and their spores also causes some change in the milk the nature of which is not yet understood, but which favours the incidents of rickets in a child thus nourished. Heating milk also destroys the anti-putrefactive quality of the lactose.

Fat.—The fats consist of olein, stearin, and palmitin. In human milk olein is an excess, whereas in cow's milk stearin and palmitin predominate. Olein is the easiest fat to digest.

Sugar.—The sugar contained in milk is lactose, which differs in an important way from cane sugar, in that it does not undergo fermentation in the stomach, which often causes diarrhœa. Lactose also preserves milk to some extent, inasmuch as it aids the growth of anti-putrefactive bacteria.

Effect of too much Proteid.—If the amount of proteid is excessive, or the relative proportion of caseinogen too high, constipation followed perhaps by diarrhœa, vomiting, colic, and flatulence result. Curds will be found in the motions, which may be green.

Effect of too little Proteid.—Fatness, anæmia, and debility will result from deficiency of proteids in the food. The infant becomes fretful and more susceptible to rickets.

Effect of too much Fat.—If about an hour after its meal the infant regurgitates sour, curded milk or a watery fluid, the food probably contains too much fat, and in this case also the motions, which are offensive, will be large, dry and grey, or less often loose and green.

Effect of too little Fat.—Constipation and colic with hard and dry motions result from the milk being deficient in fat. If long continued such an unsuitable diet will lead to a delay in the infant's growth, so that it will weigh less than normal, its teeth will be late in erupting, and it is longer in learning to talk.

Effect of too much Sugar.—An excess of lactose is said to favour the incidence of diarrhœa with green stools. Very few cases have, however, been reported.

If cane sugar is used and this is in excess, the infant may suffer from severe vomiting and diarrhœa.

Effect of too little Sugar.—The infant will lose weight, its health will depreciate, and putrefactive organisms with their attendant evils will more easily develop in its intestines.

Essentials for Artificial Feeding with Cow's Milk.—The milk should be fresh, clean, and free from preservatives. The percentage of its constituents must be uniform. The bottles and teats must be kept absolutely sterile. The infant must be fed regularly and given a proper amount of food. The cows must be healthy. The infant must be held in a proper position. The milk must be properly prepared.

Milk fresh, clean, and free from Preservatives.—Unless the temperature of milk is kept near the freezing point, any bacteria that may have infected it will continue to develop and the toxins resulting will contaminate it, causing perhaps severe gastro-intestinal irritation and death of the infant. Boiling the milk thus affected will not surmount the danger, for although the bacteria will be destroyed the poison will remain. Directly the milk is obtained it should be kept closely covered to prevent contamination. Boracic acid, which is commonly used to preserve milk, may if in excess act harmfully on the infant.

Uniformity in the Constituents of Milk.—A uniform quality of the milk can be best obtained by having a mixture of the milk drawn from several cows.

Bottles and Teats to be kept Clean.—It is best to have at least two bottles, and these should be boat-shaped and must have a hole at each end. After use the bottle must be thoroughly cleaned with soap and water, then flushed through with clean water, after which it should be transferred to a bowl containing a solution of boracic acid, and finally boiled for a few minutes before use. The teat should also be carefully cleaned and kept afterwards in boracic solution.

Position of the Infant.—The infant should be placed on its back with its head a little raised, and the bottom of the bottle should be looking upwards, so that its neck may be kept full. In this position the infant will not be so likely to suck in air with the milk, and will take its nourishment more easily.

Healthy Cows.—Before cows are used to supply milk for domestic purposes they should be tested with tuberculin to guard against the risk of tubercular infection.

Regularity of Feeding and Amount to be given.—The stomach of an infant weighing 7 lb. at birth holds 1 oz., in a fortnight 2 oz., in three months $4\frac{1}{2}$ oz., in six months 6 oz., and in twelve months 9 oz. If the infant takes too much at a meal dilatation of its stomach will eventually result. At first regurgitation and vomiting take place, later as the result of dilatation the milk undergoes putrefactive changes in the stomach, with vomiting, diarrhœa, and perhaps death as its attendant evils. The following table shows the quantity of food suitable for a meal and when it should be given for the first year of life :

Age.	Number of Feeds in 24 hours.	Interval.	Night Feeds.	Amount of each Feed.	Total Amount in 24 hours.
1st and 2nd day . .	4	4 hours	0	1 oz.	4 oz.
3rd to 7th day . .	10	2 ,,	1	1 ,,	10 ,,
2nd to 4th week .	10	2 ,,	2	$1\frac{1}{2}$ to $2\frac{1}{2}$ oz.	15 to 25 oz.
2nd month . .	8	$2\frac{1}{2}$,,	1	$3\frac{1}{2}$ oz.	26 oz.
3rd ,, . .	7	$2\frac{1}{2}$,,	0	4 ,,	28 ,,
4th ,, . .	7	3 ,,	0	$4\frac{1}{2}$,,	32 ,,
5th ,, . .	6	3 ,,	0	$5\frac{1}{2}$,,	33 ,,
6th to 10th month	6	3 ,,	0	$5\frac{1}{2}$ to 7 oz.	34 to 42 oz.
10th to 12th ,,	5	$3\frac{1}{2}$,,	0	$8\frac{1}{2}$ to 9 ,,	43 to 45 ,,

This table is for an infant weighing at birth 7 to $7\frac{1}{2}$ lb. The heavier the infant the more food does it require, and it is found that infants weighing $8\frac{1}{2}$ lb. will take $2\frac{1}{2}$ oz., and those weighing 11 lb. will take 3 oz.

Preparation of the Milk.—The milk must be suitably prepared, and as no one method will be found suitable for children, the various methods of preparation must now be carefully considered.

Preparation of Cow's Milk for Infant Consumption.—Up to Nine Months of Age.—Cow's milk may be prepared for infant consumption by diluting it with water, with whey, by the addition of albulactin, or by peptonising it, adding, where necessary or possible, sugar and cream. It may also be specially prepared by the percentage method.

Dilution with Water.—This is the mixture most often used to feed infants, but it is not at all satisfactory unless sugar and cream are added:

Age.	*Milk.*	*Water.*
1st month ...	1 part ...	2 parts
2nd „ ...	1 „ ...	1 part
3rd „ ...	2 parts ...	1 „
4th „ ...	3 „ ...	1 „
5th „ ...	4 „ ...	1 „
6th „ and onwards	All ...	*Nil*

Half a teaspoonful of lactose and a dessertspoonful of cream or a teaspoonful of cod-liver oil should be added to each feed.

Citration of Milk.—The curd formed by cow's milk differs from that of human milk, in being much more solid. The addition of citrate of soda to cow's milk has the effect of making the curd much more flocculent and soft, and hence much more easily digestible. For this purpose the salt should be added in the proportion of 2 gr. to 1 oz.

If cow's milk be citrated, a lesser dilution than that indicated in the table above can be tolerated by the infant.

This method of modifying cow's milk is very valuable, and at the same time very simple.

Eustace Smith advises that citrated milk should not be employed during the first three weeks of life, and that in the fifth month the amount of the citrate should be lessened, and in the sixth month omitted altogether.

Dilution with Whey.—Whey contains lactalbumin, sugar and salts, and by diluting the milk with it the proportion of lactalbumin can be increased. Whey mixtures may be prepared as follows:

Take 1 quart of milk and divide it into two pints. After the divided portions have stood in a cool place for four hours, skim the cream off one pint and add it to the other. This pint will therefore be richer in fat.

Add a teaspoonful of rennet to the skimmed pint, and heat to between 95° F. and 104° F. till a curd is formed, then raise the temperature to 155° F., which will destroy the rennet.

Now break the curd up, strain through muslin, and the liquid will contain lactalbumin, sugar and salt.

Age.	*Whey.*	*Enriched Milk.*
Under 2 months ...	$\frac{2}{3}$	$\frac{1}{3}$
3 to 6 months ...	$\frac{1}{2}$	$\frac{1}{2}$
Over 6 months ...	$\frac{1}{3}$	$\frac{2}{3}$

Whey mixtures, as will be seen, are troublesome to make, and their preparation requires a supervision that is not at all times obtainable.

Albulactin and Diluted Milk.—By the addition of three grains of albulactin to each ounce of the diluted milk mixture the correct proportion of lactalbumin can be obtained, and this has the additional advantage of assisting the precipitation of the casein, for it has been proved that if the proper proportion of lactalbumin is added to cow's milk suitably diluted the casein is precipitated in soft, small, flocculent curds comparable to the curds of human milk, instead of the hard, large, tough curds usually resulting from artificial feeding.

Peptonised Milk.—In some cases of marasmus it is found that although the infant cannot digest water, cream or whey mixtures, if the milk is given it predigested it will thrive. The practitioner must, however, be careful to discontinue the use of peptonised milk as soon as he can, gradually reducing the amount of peptonisation until none is necessary. It is better to prepare a proper mixture with water, cream and sugar, and then to peptonise that, and it is also better not to completely peptonise the mixture if peptonisation short of this will suffice, which, of course, can only be discovered by trial.

To peptonise milk take 20 oz. of milk, add to it 5 oz. of water and one of Fairchild's zymine powders. Keep the mixture at 110° F. for two hours, shaking it from time to time, when all the proteids will be peptonised. It is, however, as a rule, not necessary to peptonise all the proteids, the usual time being about twenty minutes.

Percentage Feeding.—It is possible to prepare cow's milk that for all intents and purposes is identical in composition with human milk. Such a method of feeding an infant is known as percentage feeding.

The greatest precautions have to be taken in milking the cows that the milk is not contaminated. The cows, therefore, have to be specially groomed, the milking sheds spotlessly clean, the utensils into which the milk flows must be sterilised by heat, the milkmen must wear clean overalls and wash their hands very carefully, and the teats of the cow must also be well washed.

Directly the milking is finished the milk-pail must be securely closed, so that dust and dirt cannot get into the milk, and the milk taken to a storehouse, there emptied into milk-cans and kept at a temperature a little above freezing point, which will ensure that if any bacteria are present they cannot multiply.

The milk when required is taken to the laboratory and its composition there altered according to the wish of the practitioner ; in

most cases milk corresponding to, in composition, human milk will be needed, but the method of percentage feeding has this great advantage, that the proportions of the constituent parts of milk can be altered at the will of the practitioner to suit the needs of any particular infant. It is evident, however, that this method of feeding must be an expensive one and not within the reach of the majority of parents.

Home Percentage Feeding.—With a little trouble and intelligence percentage feeding can be accomplished at home, and although the result cannot be so perfect as when the milk is collected and prepared under the conditions noted above, nevertheless, in certain cases where the infant is obviously losing ground, milk prepared by this method may be properly digested. This method is recommended by Holt, and the tables given are modified from those he gives.

Table 1.

The percentage of proteids, fats and sugar requisite up to 3 months.

	Proteids.	*Fats.*	*Sugars.*
1st to 4th day	0·30	1·00	5·00
5th to 7th day	0·50	1·50	5·00
2nd week	0·60	2·00	6·00
3rd week	0·80	2·50	6·00
4th to 5th week	1·00	3·00	6·00
3rd month	1·25	3·00	6·00

Mixture 1.

To obtain such a mixture prepare some 10 per cent. milk as follows:[1]

	10 % *Milk.*	*Lactose.*	*Limewater.*	*Water.*
1st to 4th day	2 oz.	1 oz.	1 oz.	16 oz.
5th to 7th day	3 ,,	1 ,,	1 ,,	15 ,,
2nd week	4 ,,	1 ,,	1 ,,	14 ,,
3rd week	5 ,,	1 ,,	1 ,,	13 ,,
4th to 5th week	6 ,,	1 ,,	1 ,,	12 ,,
3rd month	7 ,,	1 ,,	1 ,,	11 ,,

Table 2.

The percentage of proteids, fats and sugar requisite from 4 to 10 months.

	Proteids.	*Fats.*	*Sugars.*
4th month	1·50	3·50	7·00
5th month	1·75	3·50	7·00
6th to 10th month	2·00	4·00	7·00

[1] 10 % milk is obtained by mixing equal parts of fresh milk and separated cream.

Mixture 2.

To obtain such a mixture prepare some 7 per cent. milk as follows:[1]

	7 % *Milk.*	*Lactose.*	*Limewater.*	*Water.*
4th month	9 oz.	1 oz.	1 oz.	9 oz.
5th month	10 ,,	1 ,,	1 ,,	8 ,,
6th to 10th month	12 ,,	¾ ,,	1 ,,	6¼ ,,

Table 3.

The percentage of proteids, fats and sugar requisite for the 11th and 12th months.

	Proteids.		*Fats.*		*Sugars.*
11th month	2·50	...	4·00	...	5·00
12th month	3·00	...	4·00	...	5·00

Mixture 3.

To obtain such a mixture prepare some fresh milk as follows:

	Fresh Milk.	*Lactose.*	*Limewater.*	*Water.*
11th month	14 oz.	½ oz.	1 oz.	4½ oz.
12th month	16 ,,	½ ,,	1 ,,	2½ ,,

If more than 20 oz. of any of the three mixtures are required, the amount should be increased by multiples of 5 oz. Thus for 25 oz. a quarter more of each ingredient must be added, for 30 oz. one half more, and so on. If worked out it will be noted that the percentages in the mixtures 1, 2, and 3 do not quite correspond with those of the tables 1, 2, and 3, but the difference is so slight that it may be neglected; also when changing from one mixture to the other it may be, for the first day or so, the amount of water added will have to be slightly more than noted, until the infant becomes used to the new mixture.

Condensed Milk.—Under certain conditions, as, for instance, on board ship, or in the presence of certain epidemics, or when the infant is unable to take cow's milk prepared in the various ways already described, it may be necessary to try some other methods of feeding, when one of the following may be chosen: condensed milk or a proprietary food.

The prolonged use of condensed milk leads to anæmia, flabbiness, and rickets, and the infant is apt to grow very fat, as can be seen from the pictorial advertisements extolling the virtues of the various brands. Under the circumstances mentioned above condensed milk may be prescribed with advantage for a limited period. A mixture

[1] 7 per cent. milk is obtained by mixing three parts of fresh milk with one part of separated cream.

containing one part of condensed milk and two parts of water corresponds more or less in its percentages with fresh cow's milk.

When, therefore, an infant is being fed on condensed milk a mixture such as this is first made, and is then further diluted in accordance with the tables given for fresh milk.

There is a great tendency to dilute condensed milk too much, and it is probably this excess of dilution which is the principal factor in condensed milk agreeing with some infants when fresh milk will not, the percentage of the proteids, fats, and sugar having been unwittingly reduced to a point that the infant can digest them, and a similar reduction in the fresh milk would have had the same happy result.

Only the unsweetened variety of condensed milk, which contains lactose, should be used, the sweetened variety, which has far better keeping properties, being deleterious from the cane sugar contained therein.

Proprietary Foods.—Proprietary foods may be divided into good and bad. The bad varieties contain starch and are harmful, inasmuch as an infant cannot convert the starch into sugar until it is seven months old.

But even the good varieties of proprietary foods are, although they are starch free, not altogether perfect, inasmuch as they tend to contain an excess of carbo-hydrates and a deficiency of fat, whilst the proteids contained therein may be mostly vegetable proteids. An excess of carbohydrates encourages diarrhœa and flatulence, whilst a deficiency of fat will cause rickets. It is often held in favour of these proprietary foods that they must be good, as infants appear to flourish so well on them. Certainly many of the infants become very fat, but this is no criterion that the health is really perfect, and the fat may merely be the sign of rickets.

Under the circumstances already noted it may be advisable to feed the infant on some proprietary food, in which case the practitioner must be careful to procure one fulfilling as nearly as possible the requirements already noted. Most of the proprietary foods are deficient in fat.

After Nine Months of Age.—When the infant is nine months old some bread and one of the better proprietary foods can be given as an addition to the milk, and at about 10 a.m. 2 oz. of orange juice or three teaspoonfuls of beef juice may be given in addition.

Heating Milk.—Unless the source of the milk, its collection and storage are beyond reproach, the milk should be heated before it is given to the infant. It may either be Pasteurised or sterilised.

Sterilisation.—The milk must be boiled for thirty minutes.

Any bacteria or spores that may be in the milk are destroyed, the sugar is converted into caramel, the fat melts, and the lactalbumin is coagulated. The immediate result is that the milk is rendered perfectly safe, but it is more difficult to digest, favours constipation, and the taste is unpleasant.

The remote result is often, supposing the infant is reared on sterilised milk, anæmia and rickets, boiling the milk destroying some anti-rickety element.

Its use for a little while, however, will do no harm, and under certain conditions it may be indicated.

The best method of sterilising milk is by Soxhlet's apparatus, when the requisite amount of milk necessary for the twenty-four hours can be sterilised at once, and kept in bottles pure and uncontaminated until required.

Pasteurisation.—The milk must be heated to 155° F. for twenty minutes, when bacteria contaminating the milk will be killed, but not the spores. The anti-rickety element is not destroyed.

Under ordinary circumstances Pasteurisation is sufficient, and, indeed, is the best method to employ.

Both sterilisation and Pasteurisation should be carried out with fresh milk, since if much time elapses between the milking and the heating, and the milk has not been kept at a low temperature, the bacteria may have excreted toxins which are not destroyed by heat, and which may be the cause of fatal gastro-enteritis in the infant. The milk should be again warmed up to 100° F., by placing the bottle in water of that temperature, before it is given to the infant.

MANAGEMENT OF THE PREMATURE INFANT.

Four facts must be borne in mind when dealing with a premature child:

1. Its vitality is very low.
2. Its temperature easily becomes subnormal.
3. It has difficulty in sucking.
4. Its digestive powers are very feeble.

Lowered Vitality.—A premature infant requires the gentlest handling, and to save the necessary disturbance due to bathing its body should be gently rubbed with olive oil every day and then wrapped in cotton-wool. When the infant appears to be sufficiently strong to stand bathing it is important to see that the temperature of the room is correct, between 70° F. and 75° F., and that the water is heated to 102° F.

Temperature.—The temperature of the infant must be kept at a normal level, and some difficulty will be experienced in doing this,

since the most serious drawback of prematurity is the tendency of the temperature to keep falling.

The temperature has, therefore, to be kept at its proper level by means of incubators, or by fires in the nursery.

There are various forms of incubators, and as full directions are supplied with each there is no necessity to discuss them further here. The temperature at which the incubator is kept should be 90° F.

If an incubator cannot be obtained, one may be improvised out of a box lined with cotton-wool, the temperature being maintained by hot-water bottles placed at the sides and bottom of the box, the greatest care of course being taken to ensure that the bottles are well protected and cannot possibly burn the infant.

The infant having been placed in the box is covered with cotton-wool, except its head, and the whole box is covered with a blanket.

The temperature in the box must be kept between 85° F. to 95° F.

The temperature of the infant must be taken twice daily in the rectum and charted.

The practitioner must be guided as to the length of incubation necessary by the facility with which the body temperature is maintained. It will be found to vary from a few days to a few weeks.

Difficulty in Sucking.—The infant may be so weak that it cannot suck. In this case the milk having been drawn off from the mother's breast is placed right at the back of the infant's mouth with a small syringe or medicine dropper.

It occasionally happens, however, that even when the infant is fed by such means the milk will regurgitate.

In this case a No. 16 French catheter is sterilised and its end then placed at the root of the tongue; when the infant swallows, the catheter is pushed easily on into its stomach for about 14 inches. A glass funnel having been attached to the free end of the catheter, the necessary amount of food is poured through the catheter into the stomach. At the end of the meal the catheter is quickly withdrawn, a slow abstraction being favourable to vomiting.

The catheter may at times be passed more easily through the nose.

The infant should for the first few days be fed in the incubator lying on its back with its head a little raised.

Feeble Digestion.—The best nourishment for the premature infant is its mother's milk. The following table will be found useful:

For the first day one drachm of 1 in 12 cream should be given every hour.

Diet Table for Premature Children.

Day.	Amount.	Quality.	Frequency.
1st	ʒj	Cream and water, 1 in 12	Every hour
2nd	ʒj	Cream and whey, 1 in 8	Every hour
3rd and 4th Mother nursing	— ʒij to ʒiij	Breast or Milk drawn off with breast exhauster and given to child	Every two hours for 5 to 10 minutes Every two hours
Mother not nursing	ʒij to ʒiij	Cream and whey, 1 in 12, or Milk and water, 1 in 4	Every two hours
5th Mother nursing	—	Breast	Every two hours for 5 to 10 minutes
Mother not nursing	ʒiv to ʒvj	Milk and water, 1 in 4	Every two hours
6th to 14th Mother nursing	—	Breast	Every two hours
Mother not nursing	ʒj to ʒij	Milk and water, 1 in 3	Every two hours
14th to 28th Mother nursing	—	Breast	Every two hours
Mother not nursing	ʒj to ʒij	Milk and water, 1 in 2	Every two hours

Preparation of Mixtures.

Cream and water, 1 in 12 { Cream, ʒj / Water, ʒxj } or { Cream, ♏v / Water, ♏iv }

Milk and water. To every ʒij add { Cream, ♏xx / Lactose, ʒj }

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